Environmental Assessment
Navajo Generating Station Extension Lease

U.S. Department of the Interior
Bureau of Reclamation
Bureau of Indian Affairs

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ENVIRONMENTAL ASSESSMENT
FOR THE
NAVAJO GENERATING STATION EXTENSION LEASE

PREPARED FOR

U.S. BUREAU OF RECLAMATION

AND

U.S. BUREAU OF INDIAN AFFAIRS

COOPERATING AGENCIES

Gila River Indian Community
Hopi Tribe
Navajo Nation
Tohono O'odham Nation
Pueblo of Zuni

PREPARED BY

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DENVER, COLORADO

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Mission Statements

The **U.S. Department of the Interior** protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

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The **Bureau of Reclamation's** mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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The **Bureau of Indian Affairs'** mission is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of the American Indians, Indian tribes and Alaska Natives.

Abbreviations, Acronyms, and Defined Terms

°C	degrees Celsius
°F	degrees Fahrenheit
µg	microgram
ACHP	Advisory Council on Historic Preservation
action plan	NGS Emergency action plan
ADHS	Arizona Department of Health Services
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AFA	acre feet annually
AGFD	Arizona Game and Fish Department
ALA	American Lung Association
amsl	above mean sea level
APE	areas of potential affect
APS	Arizona Public Service Company
AQS	Air Quality System
ARPA	Archaeological Resource Protection Act
BART	Best Available Retrofit Technology
Basin Project Act	Colorado River Basin Project Act
BEA	U.S. Bureau of Economic Analysis
bgs	below ground surface
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BM&LP Railroad	Black Mesa & Lake Powell Railroad
BO	Biological Opinion
BMP	best management practice
BMRB	Black Mesa Review Board
BTU	British Thermal Units
CAA	Clean Air Act
CAMx	Comprehensive Air Quality Model with Extensions
CAP	Central Arizona Project
CAP	criteria air pollutant
CAWCD	Central Arizona Water Conservation District
CBR	critical body residues
CCR	Coal Combustion Residual
CDC	Center for Disease Control
CDP	census designated place
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
Class I Inventory	Class I Cultural Resources Inventory
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COPC	Chemical of Potential Concern
COPEC	Constituent of Potential Ecological Concern
Co-tenants	Salt River Project, Arizona Public Service Company, Nevada Energy, and Tucson Electric Power Company
CRA	Coal Resource Area
CSU	Colorado State University
CWA	Clean Water Act
dBA	decibel
dL	deciliter
DEIS	Draft EIS
Development Fund	Lower Colorado River Basin Development Fund

DOI	U.S. Department of the Interior
DPM	diesel particulate matter
DV	design value
Draft EIS	Draft NGS-KMC EIS
EA	Environmental Assessment
EGU	electric generating unit
EIS	Environmental Impact Statement
EMI	Ecosystem Management, Inc.
EMS	emergency medical service
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ERA	Ecological Risk Assessment
ERO	ERO Resources Corporation
ESA	Endangered Species Act of 1973
ESA	Environmental Site Assessment
Existing Lease	1969 Navajo Project Indenture of Lease
Extension Lease	New lease with a 35-year term and associated waivers, an amendment to the Existing Lease, and two Restrictive Covenants (Extension Lease; https://www.usbr.gov/ngs
FCPP	Four Corners Power Plant
FGDM	flue gas desulfurization materials
FLIGHT	EPA's Facility Level Information on Greenhouse Gases Tool
FONSI	Finding of No Significant Impact
FR	Federal Register
FWCA	Fish and Wildlife Coordination Act
GHG	greenhouse gas
GIS	Geographic Information System
gpm	gallons per minute
GWP	global warming potential
HAP	hazardous air pollutant
HFC	hydrofluorocarbon
HHRA	Human Health Risk Assessment
HHRAP	HHRA Protocol
HI	Hazard Index
HQ	Hazard Quotient
ICMM	International Council on Mining and Metals
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEFA	Institute for Energy Economics and Financial Analysis
IEUBK	Integrated Exposure Uptake Biokinetic Model for Lead in Children
IHS	Indian Health Service
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPCC	Intergovernmental Panel on Climate Change
IRMP	Integrated Resource Management Plan
ITA	Indian Trust Asset
IWG	Interagency Working Group
kg	kilogram
pg/kg-bw/day	pictograms per kilogram bodyweight per day
km	kilometer
KM	Kayenta Mine
KM BA	Kayenta Mine Biological Assessment
KMC	Kayenta Mine Complex
KM EA	Kayenta Mine 5-Year Permit Renewal Environmental Assessment, September 2017
kV	kilovolt
kW	kilowatt
LADWP	Department of Water and Power for the City of Los Angeles

Lessees	Salt River Project, Arizona Public Service Company, Nevada Energy, and Tucson Electric Power Company
LOM	Life of Mine
LSD	Logan Simpson Design
LTEMP	Long-term Experimental and Management Plan
MAF	million acre feet
MAFA	million acre feet annually
MATS	Mercury and Air Toxics Standards
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
MDN	Mercury Deposition Network
mg/L	milligrams per liter
MHI	median household income
M&I	municipal and industrial
MMT	million metric tons
MOA	memorandum of agreement
MSHA	Federal Mine Safety and Health Act
MT	metric ton
MW	megawatt
MWh	megawatt hour
N-Aquifer	Navajo Aquifer
N_2O	nitrous oxide
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NAIHS	Navajo Area Indian Health Service
NAPI	Navajo Agricultural Products Industry
Nation	Navajo Nation
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act of 1969, as amended
NESHAP	National Emission Standards for Hazardous Air Pollutants
NF3	nitrogen trifluoride
NGS	Navajo Generating Station and associated facilities
NGS Participants	U.S. (Reclamation), Salt River Project, Arizona Public Service Company, NV Energy, and Tucson Electric Power Company for July 2016-2019; includes LADWP after 2019
NHA	Navajo Housing Authority
NHPA	National Historic Preservation Act
NNDFW	Navajo Nation Department of Fish and Wildlife
NNE	Navajo Nation Endangered
NNEPA	Navajo Nation Environmental Protection Agency
NNHP	Navajo Natural Heritage Program
NNWRC	Navajo Nation Water Rights Commission
NO_2	nitrogen dioxide
NO_X	nitrogen oxide
NP	National Park
NPS	National Park Service
NRC	National Research Council
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NTUA	Navajo Tribal Utility Authority
NV Energy or NVE	Nevada Energy Company
O&M	operation and maintenance
O_3	ozone
OSHA	Occupational Safety and Health Act
OSMRE	Office of Surface Mining Reclamation and Enforcement

PAC	protected activity center
PAH	polycyclic aromatic hydrocarbons
PAP	permit application package
Pb	lead
PCE	Primary Constituent Element
PFC	perfluorocarbon
PFR	Partial Federal Replacement
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
PNM	Public Service Company of New Mexico
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
PWCC	Peabody Western Coal Company
RCRA	Resource Conservation and Recovery Act
Reclamation	U.S. Bureau of Reclamation
Response Plan	NGS Emergency Response Plan
RFD	reasonable foreseeable development
RLS	rail loadout silos
RMP	Range Management Plan
ROD	Record of Decision
ROW	Right-of-way
§ 323 Grant	Rights-of-way and easements pursuant to 25 USC § 323
Rule	Electric Utilities rule
SCR	Selective catalytic reduction
SF_6	sulfur hexafluoride
SQG	Small Quantity Generator
SMCRA	Surface Mining Control and Reclamation Act
SO_2	sulfur dioxide
SOI	Secretary of the Interior
SRI	Statistical Research, Inc.
SRP	Salt River Project Agricultural Improvement and Power District
STS	Southern Transmission System, including communication sites
SWReGAP	Southwest Regional Gap Analysis Project
TCP	Traditional Cultural Property
TDS	total dissolved solids
TEP	Tucson Electric Power Company
THPO	Tribal Historic Preservation Officer
TPT	transactions privilege tax
TRV	toxicity reference values
TSP	total suspended particulates
TW	terawatt
UCL	upper confidence limit
UDWQ	Utah Department of Water Quality
UCL	Upper Confidence Limit
U.S.	United States
USC	United States Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USDA-NASS	USDA-National Agricultural Statistics Service
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USG	Interagency Working Group of the U.S. Government
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VOC	volatile organic compounds
WHO	World Health Organization

WRCC	Western Regional Climate Center
WRI	World Resources Institute
WTS	Western Transmission System

Measurement Conversion Guide

For the reader's convenience, the following table has been included to serve as a guide in converting measurements found in this document between U.S. measurements and metric.

CONVERSION OF U.S. TO METRIC MEASUREMENTS	
U.S. Measurement	**Metric Measurement**
Distance	
1 inch	2.54 centimeters
1 foot	0.31 meter
1 mile	1.61 kilometers
Area	
1 square foot	0.09 square meter
1 acre	0.41 hectare
CONVERSION OF METRIC TO U.S. MEASUREMENTS	
Metric Measurement	**U.S. Measurement**
Distance	
1 centimeter	0.39 inch
1 meter	3.28 feet
1 kilometer	0.62 mile
Area	
1 square meter	10.76 square feet
1 hectare	2.47 acres

CONTENTS

Abbreviations, Acronyms, and Defined Terms i

Measurement Conversion Guide vi

Chapter 1. Purpose and Need 1
1.1 Background 3
1.1.1 NGS 3
1.1.2 Kayenta Mine 5
1.1.3 Transmission Lines 5
1.1.4 Prior NEPA Compliance 8
1.1.5 Location 9
1.2 Purpose and Need 9
1.2.1 Purpose of the Action 10
1.2.2 Need for the Action 10
1.3 Relationship between this Notice and Status of the Proposal to Operate NGS from 2020 through 2044 11
1.4 Government-to-Government Consultation 11
1.5 Public Involvement and Scoping 12
1.5.1 Public Scoping and Outreach 12
1.5.2 Public Comments 12

Chapter 2. Description of Alternatives 13
2.1 Introduction 13
2.2 Formulation and Evaluation of Alternatives 13
2.3 Proposed Action 13
2.3.1 Summary of Extension Lease Provisions 13
2.3.2 Activities through the End of 2019 17
2.3.3 Activities Post-2019 18
2.3.4 Summary of Required Federal Actions 22
2.4 No Action Alternative 23
2.4.1 NGS and Associated Facilities 24
2.4.2 KM 26
2.4.3 STS and WTS on Navajo Tribal Trust Lands 26
2.5 Alternatives Considered but Dismissed 26
2.5.1 Continue NGS Operation through December 22, 2019, with 12 Months for Retirement Activities 27
2.5.2 Extend the Existing Lease for up to 25 Years 27
2.5.3 Continued NGS Operation Past 2019 27
2.5.4 Replace Coal-Fired Energy Generation at NGS with Renewable Energy Such as Wind and Solar 27
2.5.5 Off-Site Disposal of NGS CCR and Solid Waste 28
2.6 Summary of Impacts 28

Chapter 3. Affected Environment and Environmental Consequences 51
3.1 Introduction 51
3.1.1 Relationship to KM EA 51
3.2 Background for Cumulative Effects 53
3.2.1 Past, Present, and Reasonably Foreseeable Future Actions 53
3.2.2 Potential Future Actions of the Nation 57
3.3 Air Quality 58
3.3.1 Regulatory Framework 58

3.3.2 Analysis Area and Methods ... 61
3.3.3 Affected Environment ... 61
3.3.4 Environmental Consequences ... 64
3.3.5 Cumulative Effects ... 76
3.4 Climate and Climate Change ... 79
3.4.1 Regulatory Framework ... 79
3.4.2 Analysis Area ... 79
3.4.3 Affected Environment ... 79
3.4.4 Environmental Consequences ... 89
3.4.5 Cumulative Effects ... 93
3.5 Geological, Mineral, and Paleontological Resources ... 99
3.5.1 Regulatory Framework ... 99
3.5.2 Analysis Area ... 99
3.5.3 Affected Environment ... 99
3.5.4 Environmental Consequences ... 101
3.5.5 Cumulative Effects ... 103
3.6 Soils ... 104
3.6.1 Regulatory Framework ... 104
3.6.2 Analysis Area ... 104
3.6.3 Affected Environment ... 104
3.6.4 Environmental Consequences ... 105
3.6.5 Cumulative Effects ... 107
3.7 Solid and Hazardous Waste ... 108
3.7.1 Regulatory Framework ... 108
3.7.2 Analysis Area ... 108
3.7.3 Affected Environment ... 108
3.7.4 Environmental Consequences ... 111
3.7.5 Cumulative Effects ... 114
3.8 Water Resources ... 115
3.8.1 Regulatory Framework ... 115
3.8.2 Analysis Areas ... 115
3.8.3 Affected Environment ... 117
3.8.4 Environmental Consequences ... 123
3.8.5 Cumulative Effects ... 127
3.9 Special Status Species ... 130
3.9.1 Regulatory Framework ... 130
3.9.2 Analysis Areas ... 130
3.9.3 Ecological Risk Assessment Methods ... 134
3.9.4 Affected Environment ... 136
3.9.5 Environmental Consequences ... 150
3.9.6 Cumulative Effects ... 165
3.10 Fish and Wildlife ... 166
3.10.1 Regulatory Framework ... 166
3.10.2 Overall Analysis Area ... 166
3.10.3 Affected Environment ... 168
3.10.4 Environmental Consequences ... 173
3.10.5 Cumulative Effects ... 175
3.11 Vegetation ... 177
3.11.1 Regulatory Framework ... 177
3.11.2 Analysis Area ... 177
3.11.3 Affected Environment ... 179

3.11.4 Environmental Consequences 188
3.11.5 Cumulative Effects 192
3.12 Land Use and Recreation 193
3.12.1 Regulatory Framework 193
3.12.2 Analysis Area 194
3.12.3 Affected Environment 194
3.12.4 Environmental Consequences 199
3.12.5 Cumulative Effects 203
3.13 Public Health and Safety 204
3.13.1 Regulatory Framework 204
3.13.2 Analysis Area 205
3.13.3 Overview 205
3.13.4 Affected Environment 208
3.13.5 Environmental Consequences 217
3.13.6 Cumulative Effects 227
3.14 Cultural Resources 229
3.14.1 Regulatory Framework 229
3.14.2 Analysis Areas 230
3.14.3 Affected Environment 230
3.14.4 Environmental Consequences 236
3.14.5 Cumulative Effects 240
3.14.6 Mitigation 240
3.15 Socioeconomics and Environmental Justice 242
3.15.1 Regulatory Framework 242
3.15.2 Analysis Area 242
3.15.3 Affected Environment 246
3.15.4 Environmental Consequences 272
3.15.5 Cumulative Effects 288
3.16 Indian Trust Assets 290
3.16.1 Regulatory Framework 290
3.16.2 Analysis Areas 291
3.16.3 Affected Environment 291
3.16.4 Environmental Consequences 291
3.16.5 Cumulative Effects 295

Chapter 4. Regulatory Guidance, Laws, and Directives 297
4.1 National Environmental Policy Act of 1969, as amended (P.L. 91-190) 297
4.2 Endangered Species Act of 1973 (ESA) (P.L. 93-205) 297
4.3 Wild and Scenic Rivers Act of 1968 (P.L. 90-542) 297
4.4 Wilderness Act of 1964 (P.L. 88-577, as amended) 298
4.5 Clean Water Act (CWA) (P.L. 92-500, as amended) 298
4.6 Clean Air Act (CAA) (P.L. 91-604, as amended) 298
4.7 National Historic Preservation Act (NHPA) (P.L. 89-665, as amended by P.L. 96-515) 298
4.8 Farmland Protection Policy Act (P.L. 97-98) 299
4.9 EO 11988 (Floodplain Management) 299
4.10 EO 12898 (Environmental Justice) 299
4.11 EO 11990 (Wetlands) 300
4.12 Department of the Interior, Secretarial Order, Indian Trust Assets 300

Chapter 5. List of Preparers and Contributors 301
5.1 Agencies and Entities Consulted 301
5.1.1 Federal 301

5.1.2 State ... 301
5.1.3 County ... 301
5.1.4 Public Involvement Process ... 301
5.2 List of Preparers ... 302
5.2.1 Federal Agency Co-lead – U.S. Bureau of Reclamation ... 302
5.2.2 Federal Agency Co-lead – U.S. Bureau of Indian Affairs ... 302
5.2.3 Cooperating Agencies ... 302
5.2.4 ERO Resources Corporation (ERO) ... 303
5.2.5 Ramboll Environ ... 303
5.2.6 Other Contributors and Reviewers ... 303

Chapter 6. Literature Cited ... 305

Chapter 7. Appendices ... 329

TABLES

Table 1. Government-to-Government Consultation Meetings. ... 11
Table 2. Summary of Environmental Consequences. ... 29
Table 3. National Ambient Air Quality Standards. ... 58
Table 4. Projected Annual CAP Emissions from EGUs Main Boiler Stacks—3 Unit Operation. ... 66
Table 5. Projected CAP Emissions from NGS Support Equipment (tons/year).* ... 67
Table 6. Total Annual HAP Emissions from NGS Operations by Pollutant. ... 67
Table 7. Modeled Air Quality Impacts from AERMOD 3-Unit Operation. ... 70
Table 8. Maximum Impact and Deposition of HAPs from NGS Emissions. ... 70
Table 9. Ozone Monitoring Results from 2011 through 2014. ... 72
Table 10. NGS Visibility Impacts Modeled by EPA. ... 72
Table 11. Annual Criteria Air Pollutant Emissions from the KM (Tons/Year). ... 74
Table 12. Maximum Modeled Air Quality Impacts of the KM within 50 km. ... 75
Table 13. Cumulative Results from Near-Field Modeling for Receptors 50 km from the NGS ... 77
Table 14. Meteorological Data Summary for the KM from 1985 to 2013 ... 82
Table 15. U.S. GHG Emissions Allocated to Economic Sectors (MMT CO_2e) ... 85
Table 16. U.S. GHG Emissions and Sinks (MMT CO_2e). ... 86
Table 17. NGS CO_2 and Total GHG Emissions. ... 91
Table 18. GHG Annual Emissions from KM Operations under the Proposed Action. ... 92
Table 19. Total Annual GHG Emissions from the Proposed Action. ... 93
Table 20. Major Regional Power Plant GHG Emissions. ... 93
Table 21. Comparison of Annual GHG Emissions from the Proposed Action to U.S. and Global GHG Emissions. ... 94
Table 22. Percentage of GHG Annual Emissions under the Proposed Action to Global, U.S., and Arizona Totals. ... 98
Table 23. Annual Waste Material Quantities and Disposition ... 109
Table 24. Federally Listed Terrestrial Species Potentially Occurring in the Analysis Areas. ... 137
Table 25. Federally Listed Fish Species Occurrence in the Lake Powell, Colorado River Regions, and Lower San Juan River Analysis Areas. ... 142
Table 26. Federally Listed, Candidate, and Proposed Plant Species Potentially Occurring in the Analysis Areas. ... 146
Table 27. Navajo Nation Endangered Species Not Federally Listed. ... 149
Table 28. Native and Nonnative Fish Species Occurring in the NGS Near-Field Analysis Area. ... 172
Table 29. Noxious Weeds and Invasive Plant Species. ... 180
Table 30. Land Cover Types and Vegetative Communities within the NGS Analysis Area. ... 181

Table 31. Land Cover Types and Vegetative Communities along the BM&LP Railroad. 182
Table 32. Land Cover Types and Vegetative Communities within the KM Analysis Area. 184
Table 33. Riparian and Wetland Vegetation Cover Types Relative to Upland Areas Underlain by the N-Aquifer. 186
Table 34. Major Land Cover Types and Vegetative Communities along the STS. 187
Table 35. Major Land Cover Types and Vegetative Communities along the WTS. 187
Table 36. NGS Acreage. 196
Table 37. Communities Near the NGS and Associated Facilities, STS, WTS, and the KM. 196
Table 38. Location and Size of Communication Sites within the Nation. 199
Table 39. OSHA Workplace Permissible Noise Exposures. 205
Table 40. Summary of Public Health Approach: Health Categories Selected for Public Health Evaluation. 207
Table 41. NGS Baseline HHRA Results. 210
Table 42. KM Baseline Risk Case Result. 211
Table 43. Source Noise and Noise Exposure Estimates. 216
Table 44. Comparison of NGS Baseline and Proposed Action HHRA Results. 224
Table 45. 2010 Population and Approximate One-Way Travel Distances to the NGS and the KM. 243
Table 46. Population on Navajo and Hopi Reservations, in Northern Arizona Counties, and in Arizona, 2000 and 2010. 247
Table 47. Population of the NGS and KM Socioeconomic Study Area, 2000 and 2010. 247
Table 48. Minority Race Populations within Northeastern Arizona. 248
Table 49. Labor Force Participation, Employment, and Unemployment, 2009 to 2013. 249
Table 50. Personal Income in Northeastern Arizona, 2013. 249
Table 51. Personal Income by Source in Northeastern Arizona, 2013. 250
Table 52. Income and Poverty in Northeastern Arizona. 252
Table 53. Income Source Characteristics in Northeastern Arizona. 252
Table 54. Managerial and Non-managerial Positions at the NGS Held by Native Americans, 2015. 254
Table 55. Place of Residence for NGS Employees, 4th Quarter 2014. 254
Table 56. Managerial and Non-managerial Positions at the KM Held by Native Americans, 2015. 255
Table 57. Place of Residence for KM Employees, 2014. 256
Table 58. Housing Occupancy and Vacancy, 2010. 259
Table 59. Selected Characteristics of Occupied Housing Units, 2010. 259
Table 60. Educational Attainment of Individuals 25 Years of Age and Older. 260
Table 61. Tribes with CAP Water Allocations. 264
Table 62. Population 2000 and 2010, Indian Tribes with CAP Water Allocations and Counties in Central and Southern Arizona. 265
Table 63. Population Forecasts for Central and Southern Arizona, 2010 to 2020. 265
Table 64. Minority Race Populations within the CAP Service Area. 266
Table 65. Selected Characteristics of Agriculture in Arizona, 2012. 267
Table 66. CAWCD Water Deliveries and Net Water Delivery Charges, 2014. 268
Table 67. CAWCD Budgeted Revenues, 2014. 269
Table 68. CAP 2014 Rates per Acre-Foot of Delivered Water. 270
Table 69. Income Characteristics of CAP-affected Tribes. 271
Table 70. Economic Consequences for Northeastern Arizona of NGS Retirement and KM Closure under the Existing Lease and Extension Lease. 279
Table 71. Socioeconomic Consequences in Northeastern Arizona of NGS Retirement and KM Closure. 281
Table 72. Summary of Consequences of Alternatives. 286

FIGURES

Figure 1. General Project Location. 6
Figure 2. Project Area and Overview, including the NGS, the STS and WTS, and the KM. 7
Figure 3. Locations of Monitoring Stations Used in the Review of Regional Air Quality. 63
Figure 4. 10-Meter Wind Rose at Page Municipal Airport Near the NGS. 81
Figure 5. 10-Meter Wind Rose for the Site BM-MET9 at the KM (Source: MMA 2016). 83
Figure 6. Gross U.S. Greenhouse Gas Emissions by Gas (Source: EPA 2017e). 85
Figure 7. Temperature Changes for 1991–2012 Compared to the 1901–1960 Average (1951–1980 Average for Alaska and Hawai'i) (Source: Walsh et al. 2014). 88
Figure 8. National Annual Precipitation Changes for 1991–2012 Compared to the 1901–1960 Average (Source: Walsh et al. 2014). 89
Figure 9. Changes in Annual Average Temperature and Precipitation (IPCC 2013, Figure 26-3). 95
Figure 10. Landfill Locations. 110
Figure 11. Overall Water Resources Analysis Areas. 116
Figure 12. Hydrogeologic Cross-Section at the NGS (Source: SRP 2017e). 119
Figure 13. Natural Resources Analysis Area. 132
Figure 14. Land Cover. 178
Figure 15. Land Use. 195
Figure 16. Navajo Generating Station 50-km Near-Field Analysis Area. 209
Figure 17. KM Residential and Reclaimed Land Surficial Soil Sampling Locations. 212
Figure 18. Socioeconomic and Environmental Justice Direct Effects Analysis Area. 244
Figure 19. Socioeconomics and Environmental Justice Indirect Effects Analysis Area. 245
Figure 20. Percentage Distribution of General Fund Expenditures by the Nation, 2013. 257
Figure 21. Customers with Highest CAWCD Water Deliveries, 2014. 268
Figure 22. CAWCD Operating Expenses by Major Category, 2014. 269
Figure 23. Water and Energy Delivery Revenue by Major CAWCD Customer Category, 2014. 270

APPENDICES

Appendix 1: Public Scoping Summary Report
Appendix 2: Regulatory Requirements Related to Retirement of NGS and Associated Facilities
Appendix 3: Existing Air Quality for the Affected Environment
Appendix 4: Navajo Nation G4 Listed Species Potentially Found in the Analysis Areas
Appendix 5: USFWS Concurrence Memorandum dated October 20, 2017
Appendix 6: Comments Received and Agencies' Responses

ENVIRONMENTAL ASSESSMENT
FOR THE
NAVAJO GENERATING STATION EXTENSION LEASE

Chapter 1. Purpose and Need

The Navajo Generating Station is an existing three-unit, 2,250-megawatt (MW) coal-fired power plant located on tribal trust lands leased from the Navajo Nation (Nation) about 5 miles east of Page, Arizona.[1] The Navajo Generating Station and related facilities[2] (NGS) operate pursuant to a 1969 "Navajo Project Indenture of Lease" (Existing Lease). In February 2017, the operator of the NGS, the Salt River Project Agricultural Improvement and Power District (SRP) and the other NGS non-federal Participants (Co-tenants, or Lessees), announced they no longer intend to operate the NGS after the Existing Lease expires on December 22, 2019 (SRP 2017a). Planned closure of the NGS is primarily the result of lower-cost energy sources, such as natural gas, which have made the coal-fired NGS plant less economically viable in recent years (*Id.*).

Construction of the NGS began in 1969, and power production started in 1973. The NGS provides baseload power to over 1 million customers in Arizona, California, and Nevada. The NGS also has historically provided over 90 percent of the power used by the Central Arizona Project (CAP), a federal project that delivers approximately 1.5 million acre-feet annually of Colorado River water from a diversion point in Lake Havasu near Parker, Arizona, to central Arizona. Colorado River water delivered via the CAP serves tribal, agricultural, municipal, and industrial water users in Maricopa, Pinal, and Pima Counties, Arizona.

The Existing Lease authorizes current NGS operations through December 22, 2019, and it provides for a 1-year period (i.e., until December 22, 2020) for retirement of the NGS facilities. Continuing current NGS operations through December 22, 2019 does not, therefore, require any federal action.

NGS retirement[3] involves a complex array of activities that will likely take longer than the 1-year period authorized in the Existing Lease. SRP has determined that a minimum of 2 to 3 years would be required to complete the major retirement activities, followed by 30 years or more for remediation and long-term monitoring. So that retirement activities could be completed by the end of 2019 or 2020, current NGS operations under the Existing Lease would end before December 22, 2019, even if the term of the Existing Lease allows for operations through December 22, 2019. To enable NGS operations to continue until December 22, 2019, and retirement to begin in 2020, the Nation and SRP (on behalf of NGS

[1] A small portion of the Lake Powell intake structure ("lake pump facility") is located on a right-of-way from the National Park Service, which expires in 2032.
[2] NGS and related facilities include an approximately 78-mile railroad and coal handling facilities at the railroad terminus and at the plant; the lake pump facility and water supply system from Lake Powell; coal-fired boilers; steam turbine generators; water treatment; air pollution control systems; waste management facilities; transformers, switchyards, transmission lines, and substations; roads; communication sites; administration, operation, maintenance and warehouse facilities.
[3] NGS "retirement" refers to all work that would occur on the NGS to remove facilities and restore the land, including decommissioning, dismantling, removal, reclamation, restoration, monitoring, and remediation where applicable.

Lessees) have agreed to a new lease effective December 23, 2019, with a 35-year term and associated waivers, an amendment to the Existing Lease, and two Restrictive Covenants (Extension Lease; https://www.usbr.gov/ngs). No coal combustion would occur during the term of the Extension Lease. Without the Extension Lease, the NGS would likely cease operations by December 2017 so that retirement could be completed by the end of 2019 or in 2020, as described above. The Nation and Lessees have agreed upon a deadline of December 1, 2017, for the Extension Lease to be effective because if the Extension Lease does not become effective by that date, the Lessees would need to immediately proceed with retirement activities to complete the retirement and restoration by December 22, 2020. The Extension Lease also would allow for continued operation of the Southern Transmission System (STS) and Western Transmission System (WTS). The issuance of federal rights-of-way (ROWs) for all leased lands is analyzed under this EA; however, the issuance of ROWs would occur in 2018. The Extension Lease and related agreements are discussed in Section 2.3.1.

The 35-year Extension Lease provides for a 5-year retirement process beginning on December 23, 2019, and provides access for an additional 30 years for remediation and long-term monitoring of the plant site and ash (CCR)[4] disposal area, through 2054. It also provides access and land rights from the U.S. Secretary of the Interior or his designated representative to operate two transmission systems on Navajo Nation Tribal Trust Lands (Navajo Tribal Trust Lands) for 35 years and retire them within 2 years, with one automatic right of renewal—to operate for 35 additional years and retire them at the end of that period. In addition, the Extension Lease provides the Nation's consent for the issuance of federal corresponding ROWs by the Bureau of Indian Affairs (BIA), Navajo Region, for all Navajo Tribal Trust Lands, including ROWs for the STS and WTS and associated operating equipment (e.g., communication sites) covered by the Extension Lease. If executed, the Extension Lease would provide additional time for the Nation and workers to plan for decreased revenue and employment. The Hopi Tribe would be similarly affected because the KM and NGS also employ Hopi tribal members; the Hopi Tribe also receives coal royalties from the KM (see Section 1.2.2).

The Extension Lease was approved by the Nation's Council on June 29, 2017, via Resolution CJN-33-17, and was signed by the Nation President on July 1, 2017. SRP and several other NGS owners signed the Extension Lease prior to the Nation signing it. The Department of Water and Power for the City of Los Angeles (LADWP) also recently signed the Extension Lease after having obtained approval from its city council. The United States Department of the Interior's (DOI's) Bureau of Reclamation (Reclamation) must provide its consent for SRP to execute the lease for the United States' share of NGS capacity that SRP holds, by contract, for the use and benefit of the United States.

This Environmental Assessment (EA) evaluates the potential environmental effects of proposed federal actions by Reclamation and BIA to approve and implement the Extension Lease and issue associated ROWs, which is the Proposed Action, and the effects of No Action. It has been prepared in compliance with the requirements of the National Environmental Policy Act of 1969, as amended (NEPA) (Public Law 91-190), Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and DOI regulations implementing NEPA (43 CFR Part 46). Reclamation and BIA are the lead federal agencies for purposes of complying with NEPA, Section 7 of the Endangered Species Act (ESA), and Section 106 of the National Historic Preservation Act (NHPA).

[4] What was formerly known as just "ash" is now part of what is known as coal combustion residuals (CCR).

1.1 Background

1.1.1 NGS

The 1968 Colorado River Basin Project Act (82 Stat. 885; Basin Project Act) authorized construction of the Central Arizona Project (CAP) and associated facilities, including a study of electric generation and transmission line alternatives to provide power to the CAP. The United States (U.S.) decided to participate in the NGS as a result of that study, and the Secretary of the Interior acquired a 24.3 percent interest in capacity from the NGS, as well as capacity in its associated transmission facilities (DOI 1969). The federal share of NGS power is used to meet the power requirements for operation of the CAP, a Reclamation project that delivers Colorado River water to central and southern Arizona. Power from the U.S.' share that is not needed to operate the CAP is sold, and revenues from the sale are deposited into the Lower Colorado River Basin Development Fund (Development Fund), which is used to assist in repayment of CAP construction costs, payment of fixed operation, maintenance, and replacement charges of CAP water to Arizona Native American tribes (CAP-affected tribes),[5] and for other statutory purposes. Construction of the NGS facilities began in 1969, and power production started in 1973. The CAP is operated by the Central Arizona Water Conservation District (CAWCD).

SRP is the operating agent for the NGS and holds a 42.9 percent ownership interest in it on its own behalf. In 2016, SRP purchased the 21.2 percent interest in NGS power and energy that was formerly held by LADWP.[6] LADWP continues to own its previously held share of the STS and WTS. Pursuant to agreements with the U.S., SRP also holds the 24.3 percent interest in the NGS for the use and benefit of the U.S., which is managed by Reclamation. SRP, LADWP, Arizona Public Service Company (APS; 14.0 percent), Nevada Power Company d/b/a NV Energy (NVE; 11.3 percent), and Tucson Electric Power Company (TEP; 7.5 percent) are collectively referred to as the "NGS Co-tenants," or as the "Lessees." With Reclamation, the six entities are collectively referred to as the "NGS Participants."

To secure the federal interest in the NGS and to develop and operate the facilities, a number of agreements were put into place over the years since 1969 involving the power plant and railroad, ROWs, water supply, plant ownership and operation, power sales, transmission systems, and coal supply. One of the primary agreements for construction and operation of the NGS, and the one most relevant to this EA, is the Existing Lease for NGS facilities between the Navajo Tribe of Indians (now known as the Navajo Nation) and the Lessees. The Existing Lease was signed in 1969 pursuant to a May 27, 1969, resolution of the Navajo Tribal Council authorizing the approval of the Lease and became effective on December 23, 1969. The Existing Lease provides the Nation's consent for the use of Navajo Tribal Trust Lands and related rights for the plant site, lake pump facility, coal conveyor and rail loading site, railroad, ash (CCR) disposal area, and transmission lines; and for the Secretary of the Interior to issue ROWs on those tribal trust lands pursuant to 25 United States Code (USC) § 323 (§ 323 Grant). Communication sites associated with transmission lines were issued as revocable use permits by the Nation.

Major terms and conditions of the Existing Lease pertinent to this EA include the following:

[5] Tribes that have CAP water allocations are Ak Chin Indian Community, Fort McDowell Yavapai Nation, Gila River Indian Community, Pasqua Yaqui Tribe, Salt River Indian Community, San Carlos Apache Tribe, Tohono O'odam Nation, Tonto Apache Tribe, White Mountain Apache Tribe, and Yavapai-Apache Nation.
[6] On July 1, 2016, LADWP and SRP executed an asset purchase agreement wherein SRP acquired LADWP's share of NGS generation through 2019. LADWP continues to participate in the NGS transmission systems. LADWP will continue to be a NGS Participant after 2019 for purposes of paying a share of the retirement costs.

- The initial term of the Existing Lease is 50 years "with the right and option in the Lessees to extend it for a period of up to an additional 25-year term by notice to the [Nation]." Section 6(a).
- The Lessees, upon request of the Nation, are required to "remove any improvements of whatever nature constructed or placed upon Reservation Lands"[7] and "restore as closely as possible to original condition the surface of any Reservation Lands modified or improved by Lessees." Section 12(b).
- The Lessees are given 12 months from the expiration or earlier termination of the Existing Lease "within which removal operations and all land surface restorations shall be complete." *Id.*
- Upon the request of the Nation, the Lessees must leave certain permanent structures, which become the property of the Nation at the end of the 12-month removal period. Section 12(c). The structures that may be retained by the Nation are listed on Exhibit 9 to the Existing Lease.
- Any property of Lessees remaining on Navajo Tribal Trust Lands at the last day of the 12-month removal period "shall, if accepted by the [Nation], become property of the [Nation]." In the event the Nation "refuses to accept any property left on Reservation Lands," the Nation shall notify the Lessees of such refusal, and the "Lessees shall pay to the [Nation] upon receipt of itemized statements the [Nation's] cost of removing and disposing of such property." Section 12(b).
- Lessees are required on or before the last day of the removal period to "take all precautions necessary to prevent unsafe conditions from existing in or about any of the Lessees['] improvements or permanent structures or other property remaining on Reservation Lands." Section 12(e). Such precautions shall include, "as minimum precautions, fencing of the Ash [CCR] Disposal Area, and of any exposed, unenclosed structures." *Id.*
- The Existing Lease sets forth specific measures to be taken to maintain the ash within the ash (CCR) disposal area including dikes and ditches and an earth cover. *Id.*
- "The [Nation] covenants that, other than as expressly set out in this Lease, it will not directly or indirectly regulate or attempt to regulate the Lessees in the construction, maintenance or operation of" the NGS, the transmission systems, or the railroad. Section 16.

As noted above, the Existing Lease provided the Nation's consent for § 323 Grants issued by the Secretary of the Interior to APS, LADWP, NV Energy, TEP, and SRP (for itself and for the use and benefit of the U.S.) for the plant site, railroad, and two transmission systems:

- The plant site § 323 Grant signed by the Secretary of the Interior on December 10, 1969, with an effective date of December 23, 1969, includes the plant site, coal conveyor and rail loading site, ash (CCR) disposal area, and related facilities. The plant site § 323 Grant expires on December 22, 2019.
- The railroad § 323 Grant was approved on January 19, 1971, and expires on January 18, 2021.
- A § 323 Grant for the Southern Transmission System (STS) was issued on February 1, 1971, for two transmission lines that extend south of the NGS across Navajo Tribal Trust Lands. The term of the § 323 Grant is for 50 years ending on January 15, 2021.
- A § 323 Grant for the Western Transmission System (WTS) was issued by the Secretary of the Interior on September 8, 1988, to LADWP for the transmission line that extends west of the NGS across Navajo Tribal Trust Lands. The term of the § 323 Grant was for 20 years

[7] Unless included in a quotation, "Reservation Lands" in this EA are referred to as Navajo Tribal Trust Lands.

from 1972 through December 31, 1992; a settlement agreement was reached with the Nation to provide rights and access through December 22, 2019.

Three communication sites located on Navajo Tribal Trust Lands that are associated with the STS, NGS, and railroad (Jack's Peak, Preston Mesa, and Zilnez Mesa) have revocable use permits issued by the Nation.

1.1.2 Kayenta Mine

Peabody Western Coal Company (PWCC) holds leases with the Nation and Hopi Tribe to mine up to 670 million tons of coal from the entire mining leasehold (including the Kayenta Mine and former Black Mesa Mine), which encompasses a total of 64,858 acres, of which an estimated 200 million tons of coal remain to be mined. Coal is supplied to the NGS from the Kayenta Mine (KM) operated by PWCC. The KM is about 80 miles southeast of the NGS on Nation and Hopi Tribal Trust Lands near Kayenta, Arizona, as shown on Figure 1. The KM permit area (Permit Area) is in the northern and eastern portions of the PWCC Lease Area as shown on Figure 2.[8] The KM is the sole supplier of coal used by the NGS, and the NGS is the sole commercial customer of coal produced at the KM. The current coal supply agreement between PWCC and the NGS Lessees runs through December 22, 2019.

The KM must undergo a permit renewal and associated NEPA compliance every 5 years to continue to operate under its existing Surface Mining Control and Reclamation Act (SMCRA) Life of Mine permanent permit (see Section 1.1.4 for more information). The Office of Surface Mining Reclamation and Enforcement (OSMRE) recently issued an EA covering the renewal of the permit authorizing mining operations and reclamation for 2015–2020 (KM EA) (OSMRE 2017). The KM EA analyzes PWCC's continued coal mining and reclamation activities through July 5, 2020 (OSMRE 2017). The assumptions, analysis areas, affected environment, and environmental consequences from the KM EA are incorporated into this EA and are cited frequently herein.[9]

1.1.3 Transmission Lines

The STS consists of two parallel 500-kV transmission lines and associated communication and other facilities, both of which begin at the NGS and head south, ending at the Westwing substation in Peoria, Arizona. The STS lines are 256 miles long and are located entirely in Arizona. The first 101 miles of the STS and two of the communication sites are located on Navajo Tribal Trust Lands (Jack's Peak and Preston Mesa); the Zilnez Mesa communication site is only used for the railroad. All six NGS Participants, including LADWP, have an interest in all or a portion of the STS, which is operated and maintained by APS. One of the STS lines connects to the Moenkopi switchyard near Cameron, Arizona, on Navajo Tribal Trust Lands.[10] SRP holds the U.S. interest for the use and benefit of the U.S. in the STS.

[8] The PWCC Lease Area also includes the former Black Mesa Mine (BMM) coal reserve areas, which are not currently permitted for mining.

[9] Agencies can reference other NEPA documentation (40 CFR Part 1502.21 – Incorporation by reference), which this EA does with respect to the recent KM EA; 43 CFR Part 46.120 also provides for the use of existing environmental analyses prepared pursuant to NEPA and CEQ regulations.

[10] In 2015, the Moenkopi Substation received a renewed ROW from the BIA as part of the Record of Decision (ROD) on the Four Corners Power Plant and Navajo Mine Energy Project EIS. The ROD is available at https://www.wrcc.osmre.gov/initiatives/fourCorners/documents/ROD/RecordofDecisionFCPP.pdf.

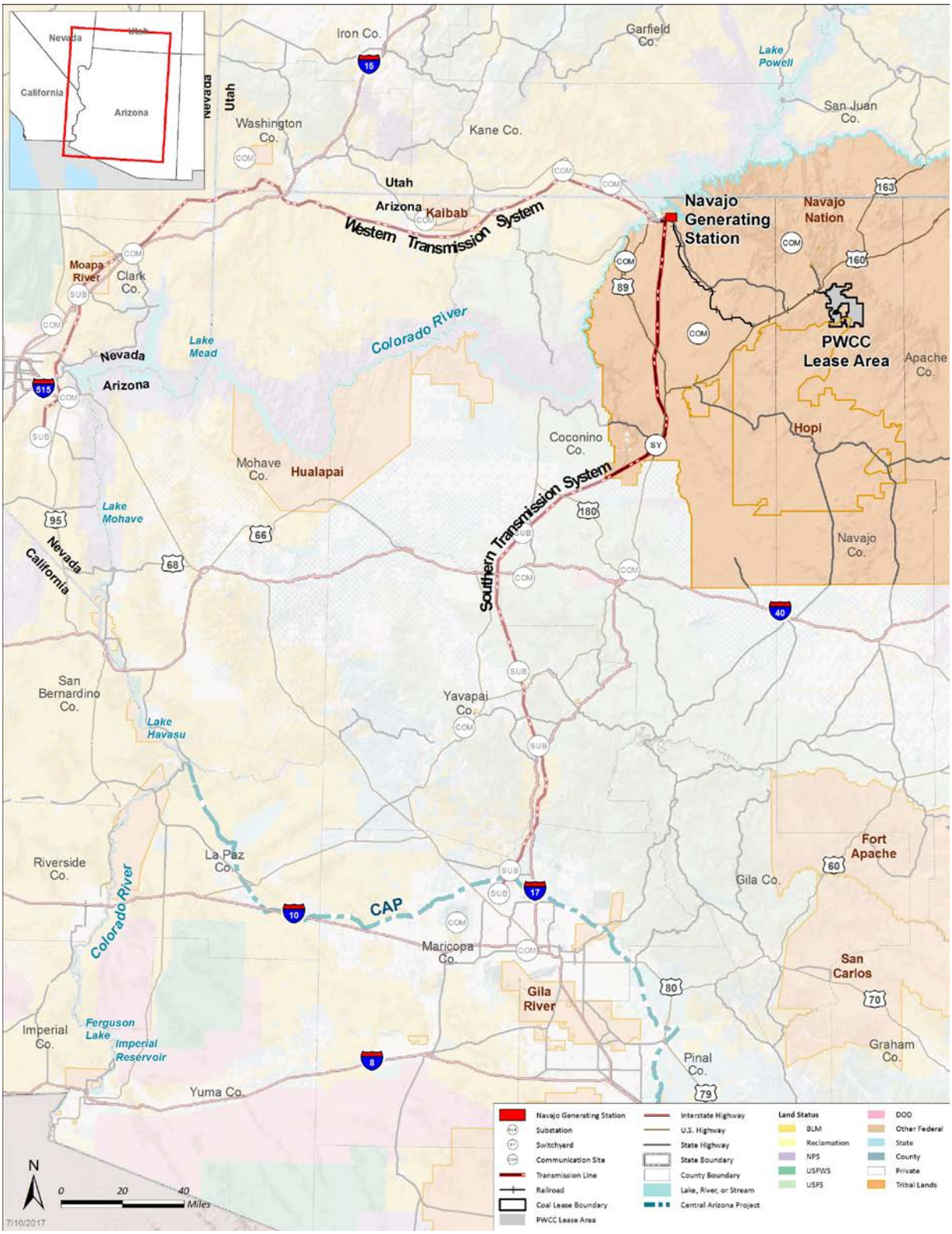
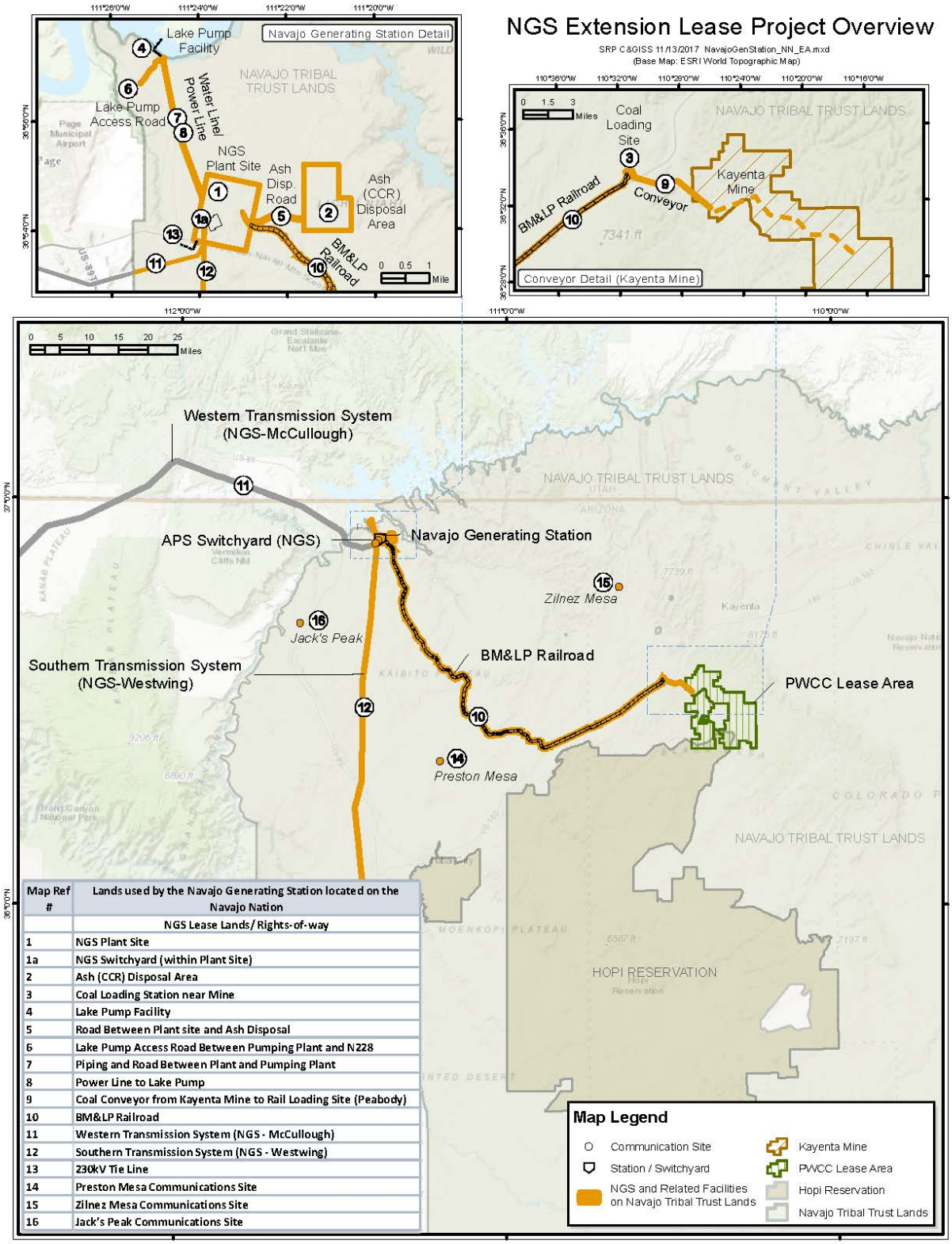


Figure 1. General Project Location.



Map Ref #	Lands used by the Navajo Generating Station located on the Navajo Nation
	NGS Lease Lands/ Rights-of-way
1	NGS Plant Site
1a	NGS Switchyard (within Plant Site)
2	Ash (CCR) Disposal Area
3	Coal Loading Station near Mine
4	Lake Pump Facility
5	Road Between Plant site and Ash Disposal
6	Lake Pump Access Road Between Pumping Plant and N228
7	Piping and Road Between Plant and Pumping Plant
8	Power Line to Lake Pump
9	Coal Conveyor from Kayenta Mine to Rail Loading Site (Peabody)
10	BM&LP Railroad
11	Western Transmission System (NGS - McCullough)
12	Southern Transmission System (NGS - Westwing)
13	230kV Tie Line
14	Preston Mesa Communications Site
15	Zilnez Mesa Communications Site
16	Jack's Peak Communications Site

Figure 2. Project Area and Overview, including the NGS, the STS and WTS, and the KM.

The WTS consists of a 500-kilovolt (kV) transmission line and associated communication and other facilities that extends for 275 miles from the NGS to the McCullough substation just outside Boulder City, Nevada. The first segment, which is about 1.8 miles long, is located on Navajo Tribal Trust Lands. The WTS is used by NV Energy, the U.S., and LADWP, which is the Operating Agent. NV Energy is responsible for on-the-ground operation and maintenance. SRP holds the U.S. interest for the use and benefit of the U.S. in the WTS.

Under the Proposed Action, the existing STS and WTS would continue to be operated and maintained as they have been since the 1970s, for 35 years until the end of the Extension Lease term in 2054. At the end of the Extension Lease term, there would be an automatic one-time extension option for 2 years to allow for retirement of the two transmission systems on Navajo Tribal Trust Lands, or for an additional 35 years of operation and subsequent retirement. Additional information on the Proposed Action for the transmission systems is provided in Section 2.3.3.3. Under the No Action alternative, the NGS Lessees would likely enter into negotiations with the Nation to ensure continuation of STS and WTS operations, including communication sites, on Navajo Tribal Trust Lands. If arrangements cannot be agreed upon regarding continued operation and maintenance, retirement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands would be completed by December 23, 2019, in accordance with the terms of the Existing Lease. Additional information on the No Action alternative for the transmission systems is provided in Section 2.4.3.

Under either the Proposed Action or No Action, the portions of the two transmission systems located off of Navajo Tribal Trust Lands would continue to be operated and maintained to deliver power from other sources. ROWs for those portions off the Nation would be renewed in the future as necessary with the appropriate land management agencies.

1.1.4 Prior NEPA Compliance

Prior NEPA compliance for the NGS and the KM includes the following:

- Reclamation prepared an EIS for the NGS in 1972 that evaluated the federal actions needed to complete the project—the power plant, railroad, coal mine, and transmission lines (Reclamation 1972a). Reclamation also prepared an EIS in 1972 for construction of the CAP system (Reclamation 1972b).
- OSMRE issued an EIS and Record of Decision on the Black Mesa-Kayenta Mine permit in 1990 (OSMRE 1990) and approved a Life of Mine (LOM) mining plan for the KM, granting Permit AZ-0001C to PWCC under the Permanent Indian Lands Program. Federal authority to continue mining the leased coal reserves within the Permit Area is only granted at 5-year intervals (permit renewals) for specific coal resource areas (CRAs) based on a mining and reclamation plan approved by OSMRE. OSMRE has approved applications to renew Permit AZ-0001C every 5 years, which allows PWCC to continue KM operations under its existing SMCRA LOM permanent permit. Where appropriate, the permit renewal process includes a review pursuant to NEPA. OSMRE converted the permit number to AZ-0001D in 1995 and AZ-0001E in 2012. Currently, the KM is operating under permit number AZ-0001E, which covers the period 2010 to 2015, for which an EA and Finding of No Significant Impact (FONSI) were completed in 2011 (OSMRE 2011b). Recently, OSMRE issued a Final EA and FONSI on a 5-year permit renewal for the KM for the period 2015 to 2020 (OSMRE 2017).
- The National Park Service (NPS) issued an EA and FONSI in 2005 for construction and operation of a deeper NGS water intake structure from Lake Powell (NPS 2005).
- Reclamation published a Notice of Intent to prepare an EIS in the *Federal Register* on May 16, 2014, for the proposed continued operations of the NGS and the Kayenta Mine Complex (KMC) for an additional 25 years, from December 23, 2019, through December 22, 2044, plus sufficient time for retirement of the NGS and reclamation of the KMC. The Draft

Environmental Impact Statement: Navajo Generating Station-Kayenta Mine Complex Project (DEIS) (Reclamation 2016b) was released to the public in September 2016, and the review and comment period closed on December 29, 2016. See Section 1.3 for additional information.

1.1.5 Location

The project has three major components:

1) the NGS and associated facilities, which include the 80-mile Black Mesa & Lake Powell (BM&LP) Railroad that delivers coal to the plant site, and the water supply system that delivers water from Lake Powell (lake pump facility);

2) the coal supply from the KM;[11] and

3) the transmission systems, comprising the STS and WTS.

The NGS is located on the Navajo Tribal Trust Lands in the LeChee Chapter near Page, Arizona. These and the other components are located across a large area of northern Arizona, with other portions in southern Nevada, southwestern Utah, and central Arizona (Figure 1). In addition, the service area of the CAP (a federal project that delivers approximately 1.5 million acre-feet per annum [AFA] of Colorado River water from a diversion point in Lake Havasu near Parker, Arizona, to central Arizona) is involved because the NGS has historically provided more than 90 percent of the power used by the CAP. Colorado River water delivered via the CAP serves tribal, agricultural, municipal, and industrial water users in Maricopa, Pima, and Pinal Counties, Arizona.[12]

As noted in Section 1.1.3, the portions of the STS and WTS located off of Navajo Tribal Trust Lands are not addressed in this EA because it is expected that they would continue to be operated and maintained to deliver power from other sources, and Reclamation and BIA have no pending actions related to those portions of the transmission systems.

1.2 Purpose and Need

Federal actions are necessary to approve and implement the Extension Lease, which has been negotiated between the Lessees and the Nation.

[11] While the Proposed Action does not require federal action related to the KM, cessation of NGS operations at the end of December 2019 would result in indirect impacts on the mining operations.

[12] The 1968 Colorado River Basin Project Act (Public Law 90-537, 82 Statute 885) authorized the construction, operation, and maintenance of the CAP, which facilitates the full utilization of Arizona's Lower Division Colorado River apportionment. It also provided the legal authority for the federal government, through the Secretary of the Interior, to enter into agreements to participate in the "Navajo Project," which generates the power and energy used to operate the CAP pump stations.

1.2.1 Purpose of the Action

The purpose of the Extension Lease is to enable the retirement of the NGS to occur after the end of the Existing Lease's term on December 22, 2019, and allow for the continued operation and maintenance of transmission systems. For the Extension Lease to become effective, BIA must approve the Extension Lease and Reclamation must give prior written consent to SRP so that SRP may sign the agreements for the use and benefit of the U.S.' entitlement to power and energy.[13] Also, BIA would issue § 323 Grants. Approval of the Extension Lease includes waivers of and exceptions to certain federal regulations. The BIA must approve and Reclamation must consent to additional interrelated agreements including Amendment No. 1 to the Existing Lease (and waivers of certain federal regulations) and two Restrictive Covenants. For the purpose of the analysis of impacts, the term "Extension Lease" is used to collectively refer to the suite of federal agency actions being evaluated in this EA.

Each of the federal decisions at issue must be consistent with federal Indian policies, including but not limited to a preference for tribal self-determination and promoting economic development for all tribes affected by these federal decisions. In addition, the federal government has a trust responsibility to protect and maintain rights reserved by or granted to Indian tribes and individuals by treaties, statutes, and executive orders (EOs).

1.2.2 Need for the Action

As indicated at the beginning of Chapter 1 (page 1), the Existing Lease authorizes NGS operations through December 22, 2019, but the time required for retirement activities is likely to exceed the 1-year retirement period described in the Existing Lease. The proposed Extension Lease and § 323 Grants would provide more time for the efficient and cost-effective implementation of retirement activities to retire the NGS, as well as provide for access to carry out required 30-year post-closure monitoring and remediation activities that are not addressed in the Existing Lease. The Extension Lease and § 323 Grants also would enable the Lessees to operate and maintain the STS and WTS on Navajo Tribal Trust Lands so that those facilities are available to the Lessees, the U.S., and the Nation to transmit power from other existing or new generation sources after 2019.

The Extension Lease, § 323 Grants, and associated waivers would provide a number of benefits to the Nation that would otherwise not be available with the Existing Lease, including greater input regarding monitoring of retirement activities, retention of additional NGS facilities for future use, receipt of additional revenues from rental payments, support from SRP regarding the Nation's rights to Arizona's Upper Basin allocation from the Colorado River, and continued NGS employment of tribal members through 2019 and Navajo preference in employment post-2019. Notably, over 90 percent of the approximately 450 NGS employees are Native American. Amendment No. 1 to the Existing Lease would provide coal royalty payment assurance to the Nation for 2018 and 2019. The Restrictive Covenants would restrict future land use—specifically on the ash (CCR) disposal area, solid waste landfill, and closed ponds—that could compromise the integrity of the environmental protection system, in perpetuity. Continued operation of the NGS would also provide 2 additional years of employment for more than 400 employees at the KM, of which about 96 percent are Native American. About 80 percent of the Hopi tribal revenue is derived from royalties associated with the KM mining operations, and Hopi tribal members are employed at the NGS and the KM.

[13] SRP must obtain the prior written consent of the U.S. (acting through Reclamation) before taking an action or making a decision that affects the rights, titles, or interests held by SRP for the benefit of the U.S. pursuant to Article 16.2 of the Navajo Project Co-Tenancy Agreement, which is summarized in the Synopsis of Documents, available at https://www.usbr.gov/ngs.

1.3 Relationship between this Notice and Status of the Proposal to Operate NGS from 2020 through 2044

An Environmental Impact Statement (EIS) process was started in 2013 to describe the effects of operating NGS from 2020 through the end of 2044. That EIS process analyzed the potential environmental impacts from extending the operations of NGS for 25 years after the end of the Existing Lease term (see Section 1.1.4), and associated changes to the KM LOM plan. Whether NGS will continue to operate after December 2019 is uncertain. There is the potential NGS would continue to operate after December 2019 with new ownership. Efforts are underway to secure new owners to operate NGS after December 2019. If NGS ownership changes, federal approvals for such new operations are likely to be required. At the time this EA was prepared, new owners have not been identified; as such, no details are known at this time, and none of these potential activities is examined in this EA (see Section 2.5.3). If new ownership takes over and sufficient details are known, environmental compliance requirements for those new arrangements would be identified by the federal or tribal lead agency, as appropriate.

Therefore, the decisions being analyzed in this EA will not: (1) authorize coal-fired generation at NGS after December 2019; (2) authorize additional coal mining at the KM; or (3) limit future decisions about uses of the NGS site if the NGS facilities are retired.

1.4 Government-to-Government Consultation

Reclamation and BIA have conducted government-to-government tribal consultation under EO 13175 (Consultation and Coordination with Indian Tribal Governments), and meeting dates, locations, and attendees are shown in Table 1. Additional government-to-government tribal consultations and informal tribal consultations will occur as needed and required to fulfill agency consultation obligations under federal law.

Table 1. Government-to-Government Consultation Meetings.

Date	Location	Attendees
July 27, 2017	Kykotsmovi, AZ	Hopi Tribe Bureau of Indian Affairs, Navajo Region Bureau of Indian Affairs, Western Region Bureau of Reclamation, Phoenix Area Office
August 4, 2017	Sells, AZ	Tohono O'odham Nation Bureau of Reclamation, Phoenix Area Office
August 11, 2017	Phoenix, AZ	Colorado River Indian Tribes Gila River Indian Community Pascua Yaqui Tribe San Carlos Apache Tribe Tohono O'odham Nation White Mountain Apache Tribe Bureau of Reclamation, Phoenix Area Office
August 25, 2017	Window Rock, AZ	Navajo Nation Bureau of Indian Affairs, Navajo Region Bureau of Reclamation, Phoenix Area Office

In addition, the scoping notice for this EA was sent to the following tribes, and the October 2017 EA notice of availability was also sent to these tribes:

- Ak-Chin Indian Community
- Colorado River Indian Tribes
- Fort McDowell Yavapai Nation

- Gila River Indian Community
- Hopi Tribe
- Hualapai Indian Tribe
- Kaibab Band of Paiute Indians
- Moapa Band of Paiute Indians
- Navajo Nation (numerous chapters)
- Pueblo of Zuni
- Paiute Indian Tribe
- Pascua Yaqui Tribe
- Salt River Pima-Maricopa Indian Community
- San Carlos Apache Tribe
- San Juan Southern Paiute
- Southern Ute Indian Tribe
- Tohono O'odham Nation
- Tonto Apache Tribe
- Ute Mountain Ute Tribe
- White Mountain Apache Tribe
- Yavapai-Apache Nation
- Yavapai-Prescott Indian Tribe

1.5 Public Involvement and Scoping

NEPA's regulations define scoping as "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to the proposed action" (40 CFR Part 1501.7). The following sections provide a summary of the scoping process, results, and the primary issues brought up during scoping that are addressed in this EA.

1.5.1 Public Scoping and Outreach

On May 23, 2017, Reclamation sent a memorandum to the mailing list for the NGS-KMC DEIS announcing public scoping for this EA to cover proposed NGS retirement activities beginning in 2020. Reclamation also issued a press release on that same date requesting public comments on the proposal. Comments were due on June 9, 2017. Some commenters requested an extension of the comment period. Although no formal extension was communicated to the public, comments received in a timely manner after the deadline were considered and are included in the Scoping Report in Appendix 1.

1.5.2 Public Comments

Scoping comments were submitted as emails, attachments to emails, and postal mail. Each comment was reviewed to assist in developing the EA with respect to background information, issues to be evaluated, and potential effects. In total, 25 comments were received during (or after) the public scoping period. The Scoping Report contains copies of the comment emails and letters as well as a summary of the comments received and is provided in Appendix 1.

Reclamation and BIA solicited public comments on the NGS Extension Lease and draft FONSIs from October 5 through November 3, 2017. All comments were carefully considered; corrections and clarifications have been made where appropriate. Submitted comments are provided in Appendix 6 to this EA, as well as Reclamation and BIA responses to relevant substantive comments received.

Five Native American tribes—the Gila River Indian Community, Hopi Tribe, Navajo Nation, Tohono O'odham Nation, and Pueblo of Zuni—requested and received cooperating agency status for the EA.

Chapter 2. Description of Alternatives

2.1 Introduction

This chapter identifies and describes the alternatives evaluated in this EA: the Proposed Action (Extension Lease) and No Action. The potential environmental effects of these alternatives are compared in Chapter 3. A brief explanation of other alternatives that were considered but dismissed from further analysis is provided later in this chapter. The chapter concludes with a summary of impacts from the Proposed Action and No Action alternatives.

2.2 Formulation and Evaluation of Alternatives

In the February 2017 statement regarding the Lessees' decision to cease NGS operations at the end of the Existing Lease term, December 22, 2019, the NGS Participants (minus LADWP) indicated the Lessees would consider operating until December 22, 2019, if necessary agreements could be obtained with the Nation to complete retirement after that date (SRP 2017a). The Nation and the Lessees successfully negotiated a new lease that was satisfactory to both parties. That lease, called the Extension Lease, is the Proposed Action that is the subject of this EA. The Proposed Action meets the purpose and need for the federal action (Section 1.22). No other action alternatives were identified that would meet the purpose and need.

2.3 Proposed Action

The Proposed Action involves federal approvals by Reclamation and BIA that are needed to execute the proposed Extension Lease, and issuance of federal § 323 Grants by BIA. The Extension Lease and § 323 Grants would enable the NGS to operate until December 22, 2019. Following cessation of operations, most NGS facilities would be retired and the area restored within 5 years, and monitoring and remediation would occur for up to 30 years. The Extension Lease and § 323 Grants would allow the STS and WTS to continue to be operated and maintained through 2054 in the same manner that has occurred since they were constructed in the 1970s with an option to extend through 2089 or decommission by 2056.

Under the Proposed Action of this NGS EA, the KM would continue to operate under existing permits to mine and supply the coal required for NGS generation. When NGS operations cease on or before December 22, 2019, it is assumed that closure and reclamation of the KM also would occur because the NGS is the sole commercial customer of coal produced at the KM.

2.3.1 Summary of Extension Lease Provisions

The Nation and the Lessees have agreed to and executed the following agreements: Extension Lease, Memorandum of Extension Lease (Memorandum), Amendment No. 1 to the Existing Lease, and two Restrictive Covenants. The Extension Lease also provides the Nation's consent for BIA to issue § 323 Grants for all leased Navajo Tribal Trust Lands that are described in the Extension Lease. Each of these agreements is summarized below. Further information regarding these agreements is available at https://www.usbr.gov/ngs. Capitalized terms have the meaning defined in the agreements.

The Extension Lease would provide continued employment of tribal members and related benefits to the regional economy. Under the Extension Lease the Nation would receive rent and other payments totaling between $54 million and $128 million depending on the timing of payments desired by the Nation. The value of the transmission system O&M being paid by the Lessees for 10 years is estimated to be $7.1 million (Smith 2017b; see also Section 3.15.4.4.2). Depending on the facilities retained by the Nation and possible participation in a new landfill as discussed below, an additional $166 million of in-kind value

may be realized by the Nation. In addition, the Nation would have a guaranty of receiving $39 million related to coal royalties through 2019.

2.3.1.1 Extension Lease and Memorandum

The Extension Lease was executed among the Nation and the NGS Lessees[14] on July 1, 2017, and, pursuant to 25 CFR Part 162, needs to be approved by the Secretary of the Interior, or his designee, by December 1, 2017. The Memorandum would be recorded to serve as public notice of the Extension Lease among the Lessees and the Nation. The Memorandum does not require BIA action. Major provisions of the Extension Lease include:

- The lease of Navajo Tribal Trust Lands would commence on December 23, 2019, and expire after 35 years, on December 22, 2054. There would be one automatic extension for the leased land associated with the transmission facilities—either a 2-year extension for decommissioning, or a 35-year extension for continued operation including retirement at the end of that extension.
- Coal combustion by the Lessees would cease by December 22, 2019, prior to commencement of the Extension Lease.
- Retirement Guidelines (SRP 2017c) that identify the criteria, standards, and requirements that would be used for retirement of the NGS and transmission facilities, with the exception of the coal conveyor and associated equipment. A Joint Lessees/Navajo Nation Consultation Group would be established and tasked with ensuring there would be open communication and information-sharing during the implementation of retirement activities. Any changes made to the Retirement Guidelines would require mutual consent of the Nation and NGS Lessees. Retirement Guidelines would be used for all NGS and transmission facilities except for the coal conveyor and associated equipment, which would be subject to SMCRA requirements.
- NGS Lessees are responsible for developing a Retirement Plan that identifies the specific activities and procedures that would be undertaken to ensure the retirement of the NGS is consistent with the Retirement Guidelines (SRP 2017c). Retirement includes all removal and restoration activities required by applicable federal law (with respect to cleanup, for non-residential uses only), the Extension Lease, and best industry practices, in that order of priority. The primary retirement activities are to be completed within 5 years, by December 22, 2024.
- Consent by the Nation for BIA to waive and make exceptions to certain BIA regulations and to issue § 323 Grants. The waivers and exceptions are subject to approval by the Secretary of the Interior or his designee.
- Waiver of jurisdiction of tribal court and waiver of Navajo law with respect to activities of the Lessees under the Extension Lease.
- Limited waiver of sovereign immunity by the Nation for actions in federal or Arizona state courts with respect to the Lessees regarding the Extension Lease.
- The Nation agrees not to regulate the Lessees with respect to any activity or absence of activity related to the Extension Lease.
- Receipt by the Nation of rental and other payments over 35 years plus other in-kind compensation.
- The Nation, at its discretion, could participate in a new separate solid waste landfill located in the ash (CCR) disposal area, which would not be part of the existing ash (CCR) landfill. The new landfill cell is estimated to accommodate up to 170,000 tons of waste, but the size, capacity, access, and types of waste are subject to negotiation between the Lessees and the

[14] LADWP would execute the Extension Lease prior to the U.S.' consents and approvals.

Nation. The Nation could continue to operate the new landfill after NGS retirement is complete. Subsequent closure of the new landfill would be the responsibility of the Nation. If the Nation elects to participate in the new landfill, the parties would negotiate all material terms at that time.

- The Nation may use up to 300 MW on the STS and 200 MW on the WTS of Reclamation's transmission capacity, with operation and maintenance (O&M) costs paid by the Lessees for the first 10 years.[15]
- Use by the Lessees of up to 1,500 AFA of water from Lake Powell for consumptive use for retirement activities. SRP would request that the Arizona Department of Water Resources (ADWR) terminate Lessees' certificates of water right when no longer needed for NGS retirement. Once the NGS stops combusting coal, SRP would support the Nation's efforts to acquire the use of a portion of the 50,000 AFA of water allocated to the State of Arizona pursuant to the Upper Colorado River Basin Compact.
- Certain structures and buildings requested by the Nation to remain and be left in place in "as is" condition.
- Specific facilities the Nation has already selected to be retained after retirement are:
  - Lake Pump Facility (including all pipelines to the metering pit at the plant, 230-kV switchyard, and associated power lines and infrastructure)
  - Railroad Track and Related Facilities (not including the overhead catenary system)
  - Fences
  - Air Monitoring Station and Equipment

- The following facilities, included in Exhibit 9 of the Existing Lease, also would be available for retention by the Nation, should it so choose by December 22, 2018:
  - Administration Building
  - Service Building
  - Warehouse
  - Water Treatment Building
  - Maintenance Building
  - Roads, Parking Lots, and Helipad

- The following facilities also would be available for retention by the Nation, if selected by the Nation prior to December 22, 2018 (note that the potential future use of these available facilities as well as specifically retained facilities mentioned above is unknown at this time):
  - Warehouse Chemical Storage
  - Engine House, Railroad Shop, and Railroad Dispatch Building
  - Zilnez and Preston Mesa Communication Sites
  - Sandblast Building
  - Raw Water Treatment System

- Removal of NGS facilities that are not retained by the Nation, and restoration of the land by the Lessees within 5 years, by December 22, 2024. One exception would be the coal conveyor and associated equipment, which would be removed by PWCC and the area restored by the end of 2035 pursuant to the SMCRA permit.

[15] As the Hopi Tribe evaluates development of potential renewable energy projects, Reclamation will evaluate available STS capacity for use by those projects.

- Access by the Lessees for post-closure monitoring and remediation activities for the remainder of the 35-year Extension Lease term.
- Restrictive Covenants placed on the Ash [CCR] Landfill and Solid Waste Landfill and Pond Solids locations would restrict use for any future developments (see Section 2.3.1.3 below).

2.3.1.2 Amendment No. 1 to the Existing Lease

Amendment No. 1 (Amendment) to the Existing Lease (Nation et al. 2013) would be signed by SRP on behalf of the United States and, pursuant to 25 CFR Part 162, would be approved by the Secretary of the Interior or his designee by December 1, 2017. The Amendment would modify the Existing Lease to replace the retirement provisions in Section 12(b) with the Retirement Guidelines. It would also provide assurance that the Nation would receive the equivalent of minimum coal royalty revenues of about $39 million for NGS operations through the end of 2019.[16] Amendment No. 1 would become effective when signed by the Secretary of the Interior, which must occur on or before December 1, 2017.

2.3.1.3 Restrictive Covenants

In addition to the Extension Lease, Restrictive Covenants contain requirements between the parties (and would be approved by the Secretary of the Interior or his designee pursuant to 25 CFR Part 84) with regard to the ash (CCR) landfill (about 490 acres), and the solid waste landfill and pond solids areas (about 155 acres), which would be capped, covered, and left in place. The covenants would restrict any future use of the land that would disturb the cover, liners, and other containment components that are left in place, in perpetuity. This would prevent damage to these facilities and continue to protect public health and the environment.

2.3.1.4 § 323 Grants

In addition to providing federal grants of right-of-way and other relevant terms and conditions in the Extension Lease, the § 323 Grants, if approved by the Secretary of the Interior or his designee pursuant to 25 CFR Part 169, would incorporate two key provisions from the Extension Lease:

- No residential, multifamily, school, child care, farm, hospice, or other use, whether commercial, for profit, or nonprofit, that would reasonably be expected to pose an unacceptable human health risk would be permitted on the leased lands, unless the Nation conducts additional remediation to render the lands suitable for the proposed use.
- The Lessees would monitor water quality in existing groundwater monitoring wells downgradient of the solid waste landfill (this is in addition to the requirements for coal combustion residuals [CCR]) to confirm that materials and structures remediated through closure in place do not pose a threat to groundwater outside the leased lands. The Lessees would consult with the Navajo Nation Environmental Protection Agency ("NNEPA") and would establish a monitoring plan that lists the constituents to be tested, the acceptable concentration limits, the wells to be sampled, and the frequency of sampling. This sampling would commence on the Term Commencement Date and continue during the § 323 Grant term for so long as the Lessees and the NNEPA agree that sampling is necessary to confirm that the closures pose no threat to groundwater outside the leased lands. If sampling indicates that groundwater concentrations in the wells exceed the limit established in agreement with the NNEPA for any constituent, the Lessees would notify the NNEPA and work cooperatively to develop an investigation plan. If this investigation plan results in verification

[16] Although not part of Amendment 1, on behalf of the NGS Participants, SRP intends to work toward a separate agreement with the Hopi Tribe to provide assurances for the equivalent of about $19 million in total coal royalties through 2019. Recent coal royalty payments to the Hopi Tribe have averaged about $13 million per year.

that the groundwater contamination originated on the leased lands and poses a threat to groundwater outside the leased lands, the Lessees would work cooperatively with the Nation to develop an action and response plan. The Extension Lease provides that the Nation would provide any access necessary for the action and response plan. If the Lessees and the Nation cannot agree on an appropriate response plan, the Lessees and the Nation would institute dispute resolution in accordance with the Extension Lease.

2.3.2 Activities through the End of 2019

2.3.2.1 NGS and Associated Facilities

Under the Proposed Action, the Lessees would execute the Extension Lease with the Nation, Amendment No. 1 to the Existing Lease would take effect, and the NGS could continue to operate until December 22, 2019 unless circumstances beyond the control of the Lessees require ceasing generation prior to that date.

Annual coal consumption at the NGS has ranged from a high of 8.2 million tons in 2012 to a low of 5.8 million tons in 2015 and 2016. Net NGS annual energy output from 2012 to 2016 ranged from 12.0 million megawatt-hours (MWh) in 2016 to 17.3 million MWh in 2014. It is anticipated that energy output from the NGS may be near or less than the lower end of this range through 2019 due to use of other lower-cost energy sources by the NGS Lessees to meet demand. However, to ensure that the entire range of effects from full operation of the NGS is considered, the analysis in the EA considers the maximum level of output of 17.3 million MWh.

Historical NGS operations would continue as they have in the past; however, maintenance, repair, and replacement activities would be reduced because the plant would be closed soon. Air pollution control processes and systems used to reduce emissions of mercury and hazardous air pollutants, nitrogen oxide (NO_X), particulate matter, and SO_2 from combustion flue gases would continue to be maintained and operated to meet all air quality standards and permits.

The water required for the generating units would continue to be obtained from Lake Powell and delivered to the plant for a variety of functions at the NGS including steam generation by the boilers, machinery bearing cooling, cooling towers, service water system, fire suppression system, and potable water. The lake pump facility is adjacent to Lake Powell on a parcel of land leased to the NGS by the Nation and includes the water intake wells and buildings that house pumps and electrical transformers.[17] The NGS is allocated 34,100 AFA for consumptive use and 5,900 AFA for nonconsumptive use.[18] Historically, annual consumptive water use has ranged up to about 29,000 AFA, but with lower energy production in recent years, annual water use dropped to about 19,000 AFA in 2015. Water use through 2019 is expected to range from about 19,000 to 22,000 AFA but could be up to 29,000 AFA if maximum generation occurs. Water is treated, reused, and recirculated to the maximum extent possible to minimize withdrawals from Lake Powell.

The NGS would continue to operate as a zero liquid discharge facility, meaning that all water brought into the plant site is reclaimed, reused, and eventually evaporated such that no liquid is discharged from the plant site. Wastewater processing facilities are designed to recover and recycle cooling tower blowdown water and storm runoff from the developed area of the facility. Groundwater protection measures are used

[17] A small portion of the lake pump facility is located on ROW from the National Park Service, which expires in 2032.
[18] Consumptive use means that the water is completely consumed by the use and not returned to the source; nonconsumptive use means that the water is returned to the source.

to prevent and monitor for any evidence of leakage from wastewater ponds. Sewage is processed in an aeration-activated sludge treatment plant and reclaimed back to water treatment influent for reuse.

SRP currently operates two federally regulated landfills within the NGS lease area, one for ash (CCR) disposal and one for asbestos disposal from dismantled facility components containing asbestos. Solid waste was previously disposed in another on-site landfill that has been inactive since 2015; all solid waste is now sent off-site to a regulated landfill. This inactive solid waste landfill might be reopened and used from 2018 through the completion of retirement activities.

The BM&LP Railroad is an 80-mile railroad used to deliver coal from the KM to the NGS and would continue to operate through 2019. When the NGS is operating at full capacity, the train runs up to 24 hours per day, 7 days per week.

Additional details on NGS facilities and operations are found in individual resource sections of this EA and in the NGS O&M Plan (SRP 2017d).

2.3.2.2 KM

The Proposed Action does not require a federal action related to the KM; however, because the NGS is the sole customer of the KM, selection of the Proposed Action or the No Action alternative would affect KM operations through the end of 2019 and the timing of subsequent reclamation. OSMRE most recently issued an EA covering operations for 2015–2020 (OSMRE 2017), which contemplates the commencement of reclamation activities no later than December 23, 2019, continuing through the release of the reclamation bond for the mine in 2035. Up to 8.1 million tons of coal would be mined annually during 2018 and 2019, and 1,236 AFA of water would be pumped from the N-Aquifer for dust suppression, potable use, and other purposes. About two-thirds of the coal mined would be from the Nation's coal resources and one-third would be from the Hopi Tribe's coal resources. These activities are not part of the Proposed Action in this EA because no actions are required by OSMRE pursuant to SMCRA. However, cessation of NGS operations at the end of December 2019 would result in indirect impacts on the mining operations, which are described in Chapter 3 of the KM EA where applicable. For additional information, see Sections 2.2 and 2.3 of the KM EA (OSMRE 2017).

2.3.2.3 STS and WTS on Navajo Tribal Trust Lands

Ongoing inspection, maintenance, repair, and replacement of the STS and WTS, switchyards, and communication sites would occur on the Nation. For additional information, see the NGS O&M Plan (SRP 2017d).

2.3.3 Activities Post-2019

2.3.3.1 NGS and Associated Facilities[19]

The Extension Lease would become effective on December 23, 2019. Retirement activities would be initiated and completed by December 22, 2024, in accordance with the Extension Lease, the Retirement Guidelines (SRP 2017c), and the Retirement Plan.

[19] The NGS and associated facilities include the 80-mile railroad and coal handling facilities at the railroad terminus and at the plant; a water supply system from Lake Powell; coal-fired boilers; steam turbine generators; water treatment; air pollution control systems; waste management facilities; transformers, switchyards, and roads; NGS and railroad related communication sites; and administration, operation, maintenance, and warehouse facilities. For the purposes of this EA, it does not include the STS and WTS.

One of the first actions in the retirement process involves completion of engineering studies to evaluate the status of NGS facilities and sites and identify all required retirement activities. A comprehensive site assessment would be conducted to determine if there are any sources or paths of contamination and identify environmental receptors and remedial actions as applicable. The site assessment would consist of a records review, site visit, and regulatory review to determine if environmental contamination is likely to be present at the property. The Retirement Plan and associated engineering design work would include a final remediated site plan based on the results of the site assessment and on-site sampling, as necessary, to assure applicable federal environmental regulations, permit requirements, and Extension Lease requirements are met.

A post-retirement assessment and completion report (similar to Environmental Site Assessment Phase III) would be prepared documenting the final site and facility conditions at the time of surrender to the Nation. The completion report would be provided to the Nation pursuant to the Extension Lease and to the BIA. The Retirement Guidelines include several approaches agreed upon by the Lessees and the Nation that would be followed as the specific Retirement Plan is developed (SRP 2017c):

- Crushed material from retirement activities that is free of contaminants may be used as backfill. No ash (CCR) would be used for backfill or topsoil.
- Removal of some ponds and closure and capping of other ponds would be consistent with best management practices (BMPs). This includes dewatering and removal of solids and liners where ponds are removed, and ongoing use of some ponds for remediation and storm water retention. Berms around ponds to be removed would be demolished to promote surface drainage. Capping would consist of placing at least 6 inches of backfill material over any solids in the pond, installing a cover liner to cover the backfill material, and then providing an additional 24-inch cover of fill material over the cover liner.
- Asbestos-containing material within the asbestos landfill would be removed and disposed of off of Navajo Tribal Trust Lands.
- Roads to retained structures would be surfaced and graded for proper drainage.
- Utilities for buildings to be retained by the Nation would be terminated at a logical location within the vicinity of these buildings before they are surrendered to the Nation. The Nation, if it desires, would be responsible for bringing utilities to these buildings. All existing utility infrastructure would remain in these retained buildings (such as heating, ventilation, and air conditioning systems, electrical, sewer, and water).
- All retirement work would be conducted by qualified contractors in accordance with applicable environmental regulations, the Extension Lease, and BMPs. Appendix 2 is a summary of applicable regulatory requirements.
- Preference would be given to hiring qualified Navajos and Navajo-owned businesses to the extent allowed by law.

A key component of retirement activities would include the development of the Retirement Plan, consistent with the Retirement Guidelines (SRP 2017c). The Retirement Plan would consist of detailed plans for the orderly and efficient retirement of NGS structures and facilities not requested to be retained by the Nation. Some of these detailed tasks may be modified over time based on the conditions encountered and experience with implementing other tasks. All modifications must be consistent with the Extension Lease and must be mutually agreed upon by the Nation and the Lessees. All proposed modifications would be shared with the Nation prior to implementing them. The Retirement Plan would assure compliance with all applicable federal regulations and industry standards regarding safety and material handling procedures. A public safety and transportation plan would be developed with input and coordination from local officials and agencies. Anticipated major tasks in the Retirement Plan may include, but are not limited to, the following:

- Identify all assets suitable for salvage or recycling, such as scrap metals, operating equipment, spare equipment, warehouse stock, process chemicals and fuels, and catenary railroad equipment.
- Use a variety of heavy equipment including cranes, loaders, dozers, scrapers, and excavators to implement retirement activities. Use blasting to bring down some structures.
- Remove all foundations and concrete structures to no less than 12 inches below final grade.
- Remove all hazardous and universal wastes and regulated substances, and drain and remove all fluids from equipment, pipes, and storage facilities.
- Remove oil-containing subgrade structures where practicable.
- Cap and abandon in place large underground piping and electrical utilities, filling those where traffic is anticipated.
- Demolish and remove the overhead catenary system, electrical distribution lines, supporting superstructure, concrete foundations, and transformers for the railroad.
- Close and cap in place the solid waste landfill using a minimum of 12 inches of cover soil with vegetation to reduce erosion of the cover.
- Transport generated wastes to the existing solid waste landfill or to a newly constructed solid waste landfill designated within the ash (CCR) disposal area but not within the existing ash (CCR) landfill.
- Close in place the ash (CCR) landfill in accordance with U.S. Environmental Protection Agency (EPA) rules and regulatory guidance (80 Fed. Reg. 21301; 40 CFR Part 257; EPA 2017f).
- Identify the extent, amount, and quality of perched water and develop and implement methods to remove the perched water.
- Modify the existing topography to maintain proper drainage and replant native vegetation with a seed mix developed in consultation with the Navajo Nation Division of Natural Resources during restoration following removal of non-retained facilities.
- Use the existing (or new) on-site solid waste landfill for suitable inert demolition debris.
- Transport and dispose of hazardous materials in compliance with the Resource Conservation and Recovery Act (RCRA; 42 USC §6901 et seq. (1976) and other applicable requirements.
- Develop and implement a drainage plan around the remaining structures.
- Repair roads damaged during retirement activities and retain perimeter fences.

Additional information on anticipated NGS retirement activities can be found in the Retirement Guidelines (SRP 2017c), which are available at https://www.usbr.gov/ngs.

Post-Closure Monitoring and Remediation activities would include monitoring and remediation of the following components, as necessary, and would extend for as long as needed to satisfy regulatory requirements: (1) perched water on the NGS site, (2) the ash [CCR] landfill, (3) solid waste landfill(s), (4) ponds, and (5) regional groundwater. The Extension Lease includes monitoring and remediation for the term of the Extension Lease and access beyond that time if needed (e.g., if additional monitoring is needed to fulfill ash (CCR) requirements).

2.3.3.2 KM

Post-2019, coal mining would cease and PWCC would continue with reclamation of mined lands. In addition, PWCC would be responsible for removal and restoration of the coal conveyors and associated

equipment that transport coal from the KM to the rail loadout.[20] Closure, facility removal, and reclamation would be done according to the provisions in the approved mine permit application package (PAP) and SMCRA regulations (OSMRE 2017).

Facilities with economic value would be dismantled or demolished and the materials removed for salvage; non-salvageable facilities would be buried. Concrete foundations and sub-bases would be removed or may be buried in place if approved by OSMRE and the Nation. If the foundations are buried in place, the cover over these structures would be a minimum of 4 feet. Grading, spoil sampling, and subsoil and topsoil replacement and seeding would occur for the facilities' areas as described in the PAP. It is expected to take 3 to 5 years to fully abandon the facilities and reclaim the surface. The KM would continue to be monitored for reclamation success with reseeding and repair of any erosional features that form on reclaimed areas (PAP, Volume 11, Chapter 20, Reclamation Schedule; and Chapter 24, Bonding). Monitoring of reclaimed mine areas is expected to take about 10 years or more prior to the final bond release. Of the 19,330 acres of affected pre-Law, initial, and permanent program land at KM, 14,546 acres have been backfilled and graded. Of those, 11,328 acres have been topsoiled and seeded, and 1,294 acres have been seeded without being topsoiled (pre-law reclamation). There are 2,450 acres that have been released through termination of Jurisdiction, after successful completion of all reclamation activities; 3,710 acres that have been released from Phase I bonding after completion of backfilling and recontouring of mined area; and 3,694 acres that have been released from Phase II bonding, after successful reestablishment of vegetation and soil productivity, and elimination of suspended solids from runoff in streams outside of the permit area. There are no lands for which Phase III bond release has occurred, which would require successful establishment of vegetation and full hydrological function (OSMRE 2009).

2.3.3.3 STS and WTS on Navajo Tribal Trust Lands

Under the Proposed Action, the existing STS and WTS would continue to be operated and maintained as they have been since the 1970s, for 35 years until the end of the Extension Lease term in 2054. As stated above, the Nation would receive from Reclamation the use and capacity of 300 MW on the STS and 200 MW on the WTS, with all O&M costs paid by the Lessees for the first 10 years. After the first 10 years, the Nation would be responsible for paying the transmission system O&M costs for their use and capacity.[21]

At the end of the Extension Lease term, there would be an automatic one-time extension option. This would be either for 2 years to allow for retirement of the two transmission systems, or for an additional 35 years of operation and subsequent retirement.

Due to the length of time until retirement of the STS and WTS anticipated to occur under the Proposed Action (either 35 years or 70 years after 2019, depending on the renewal option selected), additional studies to ensure continuing reliability of the western U.S. transmission grid would likely need to take place prior to retirement. Thus, more timely site-specific environmental clearances would be conducted prior to retirement activities, as appropriate. For purposes of this EA, the following retirement assumptions have been used:

- Five transmission line tower structures per mile on Navajo Tribal Trust Lands, or 1,020 structures for both the STS and WTS, would be removed. A workspace of 1 acre per structure

[20] Associated equipment includes but is not limited to the supporting steel structures, transfer towers, mechanical equipment and piping, coal silos, electrical equipment and wiring (including transformers, lighting, etc.), surface modifications (including culverts, sheet piling, etc.), power lines and supports, and concrete foundations.
[21] All annual non-O&M costs for its use and capacity would be paid by the Nation for each year of the Extension Lease.

would be required to allow large equipment to dismantle the structures, excavate foundations as necessary, and provide laydown areas. A total of 1,020 acres of disturbance would occur, based on these assumptions.

- Additional workspace would be required to remove and coil conductors. This requirement is assumed to be 1 acre per mile of transmission line, or 204 acres (assuming each transmission line of the STS has its own workspace).
- Existing transmission line access roads would be used to the extent practical; however, widening the existing roads and expanding the road system may be required in some locations to allow passage of large trucks and equipment such as cranes. The number of acres disturbed from road system expansion cannot be estimated at this time due to insufficient information.
- There are three STS communication sites located on Navajo Tribal Trust Lands. The Preston Mesa and Jack's Peak sites are shared with other operators and would be decommissioned by equipment removal—minor or no ground disturbance is anticipated. Zilnez Mesa is the other communication site on Navajo Tribal Trust Lands, which would be retired and restored by the end of 2024 along with the other facilities associated with the NGS, unless the Nation elects to retain this communication site.
- The 500-kV switchyard and transmission path (56 acres) located within the NGS plant site would be retired; no other switchyards or substations on Navajo Tribal Trust Lands would be relinquished back to the Navajo Nation.

Thus, as an overall estimate, approximately 1,280 acres would be disturbed from retirement of the portions of the STS and WTS located on Navajo Tribal Trust Lands. Except for possible minor disturbances to access roads, all retirement activities would occur within the leased lands and § 323 Grants. It is likely that, where feasible, above-ground structures would be cut just below ground level and removed; flat areas would be re-contoured to match the natural grade, reseeded, and stabilized for revegetation. To reduce disturbance, subsurface structures would be left in place to the extent practicable. Additional temporary disturbance for reclamation of roads and any temporary storage areas also would occur.

2.3.4 Summary of Required Federal Actions

The only federal agencies that would need to take actions under the Proposed Action are Reclamation and BIA. These actions are summarized in the following sections.

The Reclamation and BIA approvals would allow for retirement of certain NGS facilities and long-term monitoring activities on Navajo Tribal Trust Lands after operations, including continued generation of power and coal burning, end on December 22, 2019. The approvals would also enable the continued operation, maintenance, and replacement of the STS and WTS for 35 years (December 23, 2019 to December 22, 2054) with one automatic right of renewal for either 2 years for retirement, or another 35 years of operation and subsequent retirement.

2.3.4.1 Reclamation

Reclamation would need to consent to the Extension Lease agreements, a Memorandum of Extension Lease, Lease Amendment No. 1, two Restrictive Covenants, and § 323 Grants (see Section 1.3.1). Pursuant to the existing NGS Co-tenancy agreement,[22] Reclamation consent would also be needed if

[22] The Co-Tenancy Agreement (USBR Contract No. 14-06-300-2271), dated March 23, 1976, is among APS, LADWP, NV Energy, SRP, and TEP and the United States acting through the Secretary of the Interior. It establishes

amendments to any of the project agreements among the NGS Participants are necessary, or if new post-2019 agreements are developed and executed among the Participants to implement the Extension Lease and retirement.

Reclamation must also negotiate an agreement with the Nation regarding the process needed to implement the Extension Lease's commitment for the Nation's use of Reclamation transmission capacity in the STS and WTS.

2.3.4.2 BIA

BIA has a number of actions to take:

- BIA must decide, consistent with the requirements of 25 USC Part 415 (a) and 25 CFR Part 162, whether or not to approve the Extension Lease and Amendment No. 1 to the Existing Lease, which was approved by Navajo Nation Council on June 29 (Legislation No. 0194-017, Resolution No. CJN-33-17) and signed by the Navajo Nation President on July 1, 2017. As part of its approval of the Extension Lease and § 323 Grants, BIA must decide whether to waive certain regulations pursuant to 25 CFR Part 1.2 involving applicable law, lease requirements, monetary compensation, bonding, and insurance.
- BIA must decide, consistent with the requirements of 25 USC Part 323 and 25 CFR Part 169, whether or not to issue § 323 Grants of ROW for the NGS facilities and transmission systems.
- BIA must waive certain requirements pursuant to 25 CFR Part 1.2 for Amendment No. 1 to Existing Lease related to applicable law.
- BIA must decide, consistent with 25 USC § 81 and 25 CFR Part 84, whether to approve or not approve two Restrictive Covenants (ash [CCR] landfill, and solid waste landfill and pond solids).

The Memorandum does not require BIA action.

2.4 No Action Alternative

Under the terms of the Existing Lease, retirement of the NGS would be completed no later than December 22, 2020. Although NGS could operate through December 22, 2019 under the Existing Lease, the No Action alternative considers the most likely scenario of the NGS shutting down no later than December 2017 to allow sufficient time for SRP to complete retirement activities contemplated by the Existing Lease for the plant, water supply facilities, and ash (CCR) landfill. There would be no post-lease site access to conduct monitoring or remediation. There would be no Amendment No. 1 to the Existing Lease, and thus there would be no assurances of minimum coal royalty revenues for NGS operations. Because the STS and WTS convey power other than that generated by the NGS, it is likely the NGS Lessees would enter into negotiations with the Nation to continue operation, maintenance, and replacement of the transmission systems on Navajo Tribal Trust Lands (see Section 2.4.3).

Under the No Action alternative, it is anticipated that the Lessees and the Nation would coordinate planning and implementation of retirement activities of the NGS and associated facilities, and the STS and WTS. For purposes of analyzing impacts in this EA, the following assumptions were used for each project component.

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the terms and conditions of the parties' rights, interests, and obligations regarding the Navajo Project, which includes the NGS and related facilities.

2.4.1 NGS and Associated Facilities

Retirement of the NGS and its associated facilities, with the exception of the coal conveyor and associated equipment, would begin no later than January 2018 and be completed by December 2020. No coal combustion would occur by the Lessees after the plant is shut down. Retirement of the NGS under the No Action alternative is addressed in Section 12 of the Existing Lease. Beyond these general requirements, no specifics are provided. Because the Retirement Guidelines (SRP 2017c) have been developed and agreed to by both the NGS Lessees and the Nation, notwithstanding the absence of an Amendment No. 1 to the Existing Lease, for purposes of the EA analysis the Lessees and the Nation envision that an approach similar to the Retirement Guidelines would be followed in guiding the specific retirement activities under the No Action alternative, although retirement would be completed over 2 to 3 years rather than 5 years.

The major differences between the No Action alternative and the Proposed Action at the NGS are as follows:

- Most of the employees would be laid off by the end of 2017, whereas many can transition to other employers by the end of 2019 under the Proposed Action.
- Coal royalty and bonus payments to the Nation and Hopi Tribe would cease in 2017. Similarly, most other tax, fee, and other payments would end.
- Annual rental payments to the Nation under the Existing Lease are $608,400, which would cease after 2018; whereas, under the Extension Lease, payments and in-kind value to the Nation would total up to $323 million.
- There would be less time to accomplish the retirement activities, which would decrease efficiency, increase costs, and reduce the Nation's input in planning and monitoring retirement.
- The Nation would not have an opportunity to participate in a new solid waste landfill located in the ash [CCR] disposal area.

Also, the Lessees and the Nation have agreed that the Nation would have the option of accepting certain structures and buildings to remain and be left in place, as is, essentially as described under the Proposed Action (see Section 2.3.1.1).

A separate agreement would need to be negotiated between the Nation and the NGS Lessees for access to certain areas in order to conduct long-term monitoring and remediation activities that must be carried out for a minimum period of 30 years once the CCR landfill has been closed and notice of the closure has been submitted to EPA.

2.4.1.1 Retirement Actions

Retirement of the NGS and associated facilities would involve completion of the following tasks consistent with a number of regulatory requirements and SRP policies:

- Complete engineering studies to evaluate the status of NGS facilities and sites, and identify all required retirement activities.
- Conduct a comprehensive environmental site assessment to determine if there are any sources or paths of contamination and identify environmental receptors and remedial actions as applicable. Engineering design work would develop a final remediated site plan based on applicable environmental regulations and Existing Lease requirements.
- Develop a comprehensive plan for retirement including detailed plans for the orderly and efficient retirement of NGS structures and facilities not requested to be retained by the Nation.

- Identify all assets suitable for salvage or recycling, such as scrap metals, operating equipment, spare equipment, warehouse stock, process chemicals and fuels, and catenary railroad equipment.
- Use a variety of heavy equipment including cranes, loaders, dozers, scrapers, and excavators to implement retirement activities. Use blasting to bring down some structures.
- Remove all foundations and concrete structures to no less than 12 inches below final grade.
- Remove all hazardous and universal wastes and regulated substances, and drain and remove all fluids from equipment, pipes, and storage facilities.
- Remove oil-containing subgrade structures where practical.
- Cap and abandon in place large underground piping and electrical utilities, filling those where traffic is anticipated.
- Demolish and remove the overhead catenary system, electrical distribution lines, supporting superstructure, concrete foundations, and transformers for the railroad.
- Close and cap in place the solid waste landfill using a minimum of 12 inches of cover soil with vegetation to reduce erosion of the cover.
- Transport generated wastes to the existing solid waste landfill or to a newly constructed solid waste landfill designated within the ash (CCR) disposal area but not within the existing ash (CCR) landfill.
- Close in place the ash (CCR) landfill in accordance with EPA rules and regulatory guidance (80 Fed. Reg. 21301; 40 CFR Part 257; EPA 2017a).
- Identify the extent, amount, and quality of perched water and develop and implement methods to remove the perched water.
- Modify the existing topography to maintain proper drainage, and replant native vegetation with a seed mix developed in consultation with the Navajo Nation Division of Natural Resources during restoration following removal of non-retained facilities.
- Use the existing (or new) on-site solid waste landfill for suitable inert demolition debris.
- Transport and dispose of hazardous materials in compliance with the Resource Conservation and Recovery Act (RCRA; 42 USC §6901 et seq. [1976]) and other applicable requirements.
- Develop and implement a drainage plan around the remaining structures.
- Repair roads damaged during retirement activities and retain perimeter fences.
- Use crushed material from retirement activities that is free of contaminants as backfill. No ash (CCR) would be used for backfill or topsoil.
- Remove some of the ponds and close and cap other ponds consistent with BMPs. This includes dewatering and removal of solids and liners where ponds are removed, and ongoing use of some ponds for remediation and storm water retention. Berms around ponds to be removed would be demolished to promote surface drainage. Capping would consist of placing at least 6 inches of backfill material over any solids in the pond, installing a cover liner to cover the backfill material, and then providing an additional 24-inch cover of fill material over the cover liner.
- Remove and dispose of asbestos-containing material within the asbestos landfill off of Navajo Tribal Trust Lands.
- Surface and grade roads to retained structures for proper drainage.
- Terminate utilities for buildings to be retained by the Nation at a logical location within the vicinity of these buildings before they are surrendered to the Nation. The Nation, if it desires, would be responsible for bringing utilities to these buildings. All existing utility infrastructure would remain in these retained buildings (such as heating, ventilation, air conditioning, electrical, sewer, and water).

- Ensure that all retirement work would be conducted by qualified contractors in accordance with applicable environmental regulations and BMPs. Appendix 2 contains a summary of applicable regulatory requirements.
- Give hiring preference to qualified Navajos and Navajo-owned businesses to the extent allowed by law.
- Develop a post-closure monitoring and remediation plan to address (1) perched water on the NGS site, (2) the ash (CCR) landfill, (3) solid waste landfill(s), (4) ponds, and (5) regional groundwater.

2.4.2 KM

It is assumed the KM would cease mining at about the same time as NGS operations cease, depending on the size of the coal reserves on hand; reclamation would continue, and facility removal would commence thereafter (see discussion in KM EA, Section 2.3.1). This would include facility removal of the coal loadout and coal conveyors and associated equipment by December 22, 2019, although final reclamation and bond release may not occur until the end of 2035 under mine permit and SMCRA requirements. PWCC access for monitoring and bond release for these facilities would be addressed in a separate agreement between PWCC and the Nation.

The major differences between No Action and the Proposed Action at the KM are as follows:

- About half of the employees would be laid off by the end of 2017, whereas they would continue to have work through 2019 under the Proposed Action.
- Coal royalty and bonus payments to the Nation and Hopi Tribe would cease in 2017. Similarly, payment of taxes, fees, and other payments would also cease 2 years earlier than under the Proposed Action.

2.4.3 STS and WTS on Navajo Tribal Trust Lands

Under the No Action alternative, it is likely the NGS Lessees would enter into negotiations with the Nation to ensure continuation of STS and WTS operations, including communication sites, on Navajo Tribal Trust Lands, for continued use and O&M rather than remove the existing transmission infrastructure. The Nation has a strong interest in developing renewable energy projects on its lands, and availability of these systems would facilitate and support these efforts. Retention of these transmission facilities would enable the Nation to negotiate for access to their capacity and use in the future.

If, however, arrangements cannot be agreed upon regarding continued operation and maintenance, retirement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands would be completed by December 23, 2019, temporarily disturbing approximately 1,280 acres. Retirement activities would occur as described under the Proposed Action in Section 2.3.3.3. For purposes of the analysis of impacts in Chapter 3, it is assumed that the STS and WTS would be retired by the end of 2019.

2.5 Alternatives Considered but Dismissed

Several alternatives were identified during internal and external scoping that were considered and dismissed from further analysis in this EA. NEPA guidelines provide reasons to eliminate alternatives including technical or economic infeasibility; inability to meet project objectives or resolve need; conflict with agency policy; or too great an environmental impact. The following alternatives were considered but dismissed from further analysis for the reasons described below.

2.5.1 Continue NGS Operation through December 22, 2019, with 12 Months for Retirement Activities

The Existing Lease anticipated NGS operation through 2019, allowing 1 additional year for removal of buildings and structures (except those the Nation chooses to retain), and for surface restoration of all lands. The NGS plant includes numerous large structures including three power blocks with 775-foot-high stacks, cooling towers, air pollution control equipment, wastewater management ponds, coal handling equipment, buried utilities, fuel and chemical storage, an 80-mile railroad, and solid waste, ash (CCR), and asbestos landfills. Safe and efficient decommissioning and dismantling of this complex array of structures plus restoring and revegetating disturbed lands are now estimated to take 2 to 3 years, at a minimum. Completion of all retirement activities within the terms of the Existing Lease is not technically feasible in 12 months, even if a 12-month period is contemplated in the Existing Lease. Environmental regulations and safety practices, not in place at the time of the Existing Lease's signing, require careful and prescribed treatment for safely decontaminating, containing, and disposing of various waste products present at the NGS. The operator, SRP, determined it was not feasible to operate the NGS through 2019 and complete retirement activities within 12 months.

2.5.2 Extend the Existing Lease for up to 25 Years

The Existing Lease allows the Lessees to extend the term for up to 25 years. This would provide the 5 years of additional time now deemed necessary to complete all retirement activities. However, since the extension would have a duration of, at most, 25 years, this amount of time might not be sufficient to meet the NGS owners' monitoring obligations under the CCR regulations. The extended lease would not provide access for long-term monitoring and remediation after the 25-year extension period. Also, the Existing Lease does not contain Restrictive Covenants that would ensure the ash (CCR) disposal area, solid waste landfill, and settling basins are properly protected against future use.

It should be noted the Nation opposed this approach because it would not have access to the NGS site for 25 years. The Nation wants access to the NGS site as soon as practicable for economic development to replace lost jobs and revenue.

2.5.3 Continued NGS Operation Past 2019

A Draft EIS for the continued operation of the NGS beyond the terms of the Existing Lease up to 2044 was released in September 2016. The proposed action included an Existing Lease amendment, extension of other ROWs, and agreements to allow ongoing NGS operations and coal mining at the proposed KMC. However, since that project was initiated, lower-cost energy from natural gas has made coal-based energy production at the NGS uneconomical for the NGS Lessees. Continued NGS operation beyond the term of the Existing Lease is not a viable economic option for the current NGS owners, so this alternative was dismissed from further consideration.

Should the Nation and new owners, other than the current NGS owners, decide to continue operation of the NGS beyond the Existing Lease, the existing EIS process would be evaluated to determine how to comply with NEPA and other applicable statutes. Completion of the current EA for NGS retirement would not preclude the Nation and other partners from pursuing long-term operation of the NGS.

2.5.4 Replace Coal-Fired Energy Generation at NGS with Renewable Energy Such as Wind and Solar

This alternative does not meet the purpose and need of the Proposed Action, which is to allow for the efficient and cost-effective retirement of the NGS and associated facilities; access for remediation and monitoring activities for up to 35 years; and grants of ROW needed for the continued operation, maintenance and replacement of the STS and WTS on Navajo Tribal Trust Lands for an additional 35

years. This alternative does not address the need to complete retirement activities at the NGS, which would have to precede installation of renewable energy facilities if such were to be developed at the plant site.

2.5.5 Off-Site Disposal of NGS CCR and Solid Waste

Public scoping comments requested evaluation of alternatives to closure in place of NGS CCR and solid waste landfills because of potential contamination of air, water, and soil. Suggested alternatives included moving the waste to another site, recycling it, or finding some other alternative.

Coal ash (CCR) at the NGS has been and continues to be recycled to the maximum extent possible by selling the fly ash to building product manufacturers (SRP 2017d). The remaining ash has been deposited in the ash (CCR) disposal area since operations began in 1973. It would not be possible to separate out fly ash from other wastes once it has been deposited in the ash (CCR) disposal area. Moving the CCR and solid wastes to another location would be cost-prohibitive and result in additional environmental impacts from moving more than 18 million cubic yards of material, already placed in the landfills, to a new site. EPA has recognized that “leaving CCRs in place with safeguards and monitoring may achieve the necessary environmental protections and in fact offer a significantly lower environmental footprint and cost than removal and disposal off site” (EPA 2017d).

No other feasible alternative to on-site closure that would result in less harmful environmental effects was identified; thus, this alternative was dismissed from further consideration. The potential contamination of air, water, and soil from closure of these waste sites in place is addressed in Sections 3.3 (Air Quality), 3.7 (Solid and Hazardous Waste), and 3.8 (Water).

2.6 Summary of Impacts

The impacts described in Chapter 3 are summarized in Table 2 below by resource for the No Action alternative and the Proposed Action. The No Action alternative provides a baseline against which the impacts of the Proposed Action are compared.

Table 2. Summary of Environmental Consequences.

Resource	No Action	Proposed Action
Air Quality	**NGS and Associated Facilities**. Impacts from fugitive dust from retirement activities would depend on a number of factors and would vary over the course of retirement activities, but impacts would be localized and limited to the period in which retirement activities are ongoing. Best management practices (BMPs) for dust control would be adopted to minimize emissions and air quality impacts. Heavy vehicle and equipment use and the use of explosives in demolition blasting would result in engine exhaust emissions of CO, NO_2, and SO_2, as well as DPM. Both of these emissions categories would be limited to the period of retirement activities and localized to the plant site, with negligible impacts beyond the plant site. **KM**. Emissions would be associated with heavy equipment operation engine exhaust and fugitive dust emissions associated with wind erosion and overburden replacement. Emissions during reclamation activities would be less than during active mining. Impacts would be localized and likely well below the ambient air quality standards. **STS and WTS on Navajo Tribal Trust Lands**. In the likely event that operations of the STS and WTS continue, there would be no changes from current air resource impacts. In the unlikely event that arrangements cannot be agreed upon regarding continued operation and maintenance, retirement activities would likely result in localized emissions that would likely be well below the ambient air quality standards.	**NGS and Associated Facilities Operation**. The largest sources of CAPs and HAPs at the NGS facility are the electric generating units (EGUs). Support equipment and operations at the NGS are also sources of air emissions. The air quality analysis demonstrates compliance with the NAAQS for all CAPs, and there would be no exceedance of the NAAQS for any pollutants. Indirect air quality effects from the Proposed Action would include the continued delivery of materials and chemicals to the NGS through December 2019, as well as hauling of coal combustion residuals off-site to customers or to a separate landfill. The effect of indirect activities in support of the NGS would be minimal because the air quality effects of materials delivery would involve traffic on public highways, and emissions would have transient impacts at any specific location. The BM&LP Railroad would continue to operate as it has historically until retirement activities begin in 2019. It operates on electric power provided by the NGS, and thus the emissions produced from powering the railroad are already accounted for in NGS emissions. Other potential sources of air emissions from railroad operation include fugitive coal dust emissions during railroad transport and unloading, and routine and emergency maintenance and repair; emissions and environmental impacts from these activities would be negligible because these impacts would be infrequent, short in duration, and localized. **NGS and KM Retirement**. The annual emissions and air quality impacts during retirement activities for both the NGS and the KM in the Proposed Action would be comparable to those in the No Action alternative, albeit over a longer period for the NGS (for 2 extra years). **KM Operations**. KM emissions of air pollutants are generated by mining operations (coal and overburden removal and transport), coal preparation plant activities (coal transfers, crushing, screening, stockpiling), and wind erosion of stockpiles and of disturbed areas. There would be negligible effects from 2 years of KM mining operations under the Proposed Action. Based on the percentage comparison and the modeled concentrations, the potential impacts of all criteria pollutants would be well below ambient air quality standards and the potential impacts of hazardous air pollutants from the continued operation of the mine for 2 years would be negligible under the Proposed Action. **STS and WTS on Navajo Tribal Trust Lands**. Maintenance activities for the transmission lines, communication sites, and access roads would result in exhaust emissions and fugitive dust emissions from vehicle traffic on unpaved roads. Emissions of criteria pollutants associated with small transmission line maintenance crews would be widely dispersed in space and time. Therefore, emissions for future operations and maintenance would be slight, and impacts from future operations emissions would be infrequent, of short duration, and localized. Retirement of the STS and WTS on Navajo Tribal Trust Lands would result in the same impacts as described for the No Action alternative.

Resource	No Action	Proposed Action
Climate and Climate Change	**NGS and Associated Facilities**. Retirement activities would require use of a variety of heavy equipment including cranes, loaders, dozers, scrapers, and excavators. Fuel usage of the heavy vehicles and equipment used in retirement activities would result in CO_2, CH_4, and N_2O emissions, and the magnitude of the GHG emissions would depend on the number of heavy equipment required for each operation and the total hours of use. Emissions would only occur during retirement activities and would be less than emissions during active operations. The impacts of the retirement of the NGS and associated facilities on climate change are expected to be negligible. **KM**. Upon shutdown of the mine, heavy equipment use for reclamation operations would continue to contribute to GHG emissions until reclamation is completed. GHG emissions of CO_2, CH_4, and N_2O would result from the fuel usage of heavy equipment during retirement operations; retirement emissions impacts on climate change are expected to be negligible. **STS and WTS on Navajo Tribal Trust Lands**. Emissions from retirement of the STS and WTS on Navajo Tribal Trust Lands would only occur during the retirement activities, and the impacts on climate change are expected to be negligible. Potential GHG emissions from the continued operation and maintenance of these systems would be the same as described for the Proposed Action.	**NGS and Associated Facilities**. The annual estimated GHG emissions from the NGS would comprise approximately 0.04 percent, 0.28 percent, and 17.5 percent of the total global, U.S., and Arizona GHG emissions, respectively, during the 2 years of continued operation. While the continued operation of the NGS would contribute incrementally to climate change, predicting the degree of impact that any single emitter of GHGs may have on global climate change, or on the changes to biotic and abiotic systems that accompany climate change, is not possible at this time. No tools or scientifically defensible analysis methods exist to describe the degree to which any observable changes would be attributable to the Proposed Action. However, the 2-year GHG emissions from the NGS under the Proposed Action would be a small fraction of the emissions from EPA's modeled hypothetical source that was shown to have a very small impact on climate change after 50 years. Therefore, NGS operation under the Proposed Action involving 2 years of operation would have no measurable impact on climate and would be negligible. **KM**. GHG emissions sources from KM mining operations come primarily from methane released by the exposure of the coal seams to the atmosphere and combustion emissions from mining equipment. The estimated annual GHG emissions from the mine comprise 0.0002 percent, 0.0014 percent, and 0.089 percent of global, U.S., and Arizona GHG emissions, respectively. As the GHG emissions from the KM are much less than those from the NGS, the continued operation of the KM would also have no measurable impact on climate and would be negligible. **STS and WTS on Navajo Tribal Trust Lands**. For the STS and WTS on Navajo Tribal Trust Lands, except for the GHG emissions from maintenance operations and incidences of on-site emergency power generation at communication sites, there would be no other GHG emissions associated with continued operation and maintenance. The GHG emissions generated during future operation and maintenance of the entire transmission system would have a negligible effect on total GHG emissions from the Proposed Action. Potential GHG emissions from the retirement of the STS and WTS on Navajo Tribal Trust Lands would be the same as described under the No Action alternative.
Geological, Mineral, and Paleontological Resources	**NGS and Associated Facilities**. During and following retirement activities, direct impacts would be short-term and negligible for geologic strata, landforms, topography, and mineral resources because little, if any, new ground disturbance is anticipated. If a new solid waste disposal area is created in the ash disposal area, geologic strata may be affected in the short term to create the disposal area. Impacts on paleontological resources would be negligible because of the generally low to moderate Potential Fossil Yield Classification rank of the bedrock formations. **KM**. Indirect impacts on geologic strata, landforms, topography, mineral resources, and paleontological resources would be short-term and negligible because there would be little new	**NGS and Associated Facilities**. Continued operation of the NGS would cause limited disturbance to geologic strata. Impacts related to NGS retirement activities for the Proposed Action would be the same as those stated for the No Action alternative. Conducting retirement activities over a 5-year period as opposed to a 2- to 3-year period, as proposed under the No Action alternative, would not generate impacts greater than those for the No Action alternative. **KM**. Between 2017 and 2019, up to 16.2 million tons of coal would be mined, and mining operations and reclamation of previously mined areas would continue in the same manner as they have historically. In relationship to the total coal resource of 4.8 billion tons, this would be a negligible effect. The mining represents the permanent loss of geological continuity of the overburden and the permanent loss of the mineral resource mined. If important or unusual paleontological resources are detected during mining activity, work in the area would cease, and a qualified professional would evaluate the area for the recovery

Resource	No Action	Proposed Action
	disturbance from post-mining activities. **STS and WTS on Navajo Tribal Trust Lands**. Retirement of the systems represents a negligible short-term impact on geological, mineral, and paleontological resources as the necessary equipment is mobilized and the transmission system is removed. Once removed, there would be no long-term impacts. If the STS and WTS continue to be operated, impacts would be the same as those under the Proposed Action alternative.	of important or unusual fossils prior to resuming mining operations. However, it is likely some fossils would inevitably be lost during the mining activities. Whether these lost fossils would be scientifically important is unknown. Indirect impacts related to facility removal and reclamation activities for the Proposed Action would be the same as those stated for the No Action alternative. **STS and WTS on Navajo Tribal Trust Lands**. Continued operation of the transmission systems represents a negligible short-term impact on geological, mineral, and paleontological resources. Operation and maintenance of the STS and WTS requires periodic aerial and ground inspections, repair and maintenance of infrastructure, maintenance of access routes, and treatment of vegetation within the ROW corridors. Impacts from retirement would be the same as those under the No Action alternative.
Soils	**NGS and Associated Facilities**. During retirement activities, direct impacts on soil resources in the analysis area would be short-term and limited to areas where heavy equipment is used on undisturbed soils. After retirement activities, operations would cease, vegetation would reestablish, and the soil horizon would equilibrate and recover. If a new solid waste landfill is constructed near the ash disposal landfill, short-term impacts would occur during construction and filling of the landfill; however, upon closing and capping the landfill, long-term impacts would be negligible following reclamation activities. All restored land would be covered with topsoil indigenous to the area and revegetated with native plants, resulting in an increase in the amount of topsoil in the analysis area and a long-term beneficial impact on soil resources. **KM**. Indirect impacts on soils from the KM would be short-term and negligible during closure because mining operations would cease, facilities would be removed, open pits associated with the mining would be filled, and reclamation would take place within previously disturbed areas. Soil productivity and stability would increase over time in the areas reclaimed, resulting in a beneficial long-term impact and suitability for post-mine land uses (livestock grazing, wildlife habitat, and cultural plants). **STS and WTS on Navajo Tribal Trust Lands**. Retirement of the systems on Navajo Tribal Trust Lands would represent a short-term impact on soil resources as the necessary equipment is mobilized and the transmission system is removed. Once removed, long-term impacts would be negligible as the soil horizon equilibrates following the removal of the system. If the STS and WTS continue to be operated, impacts would be the same as those under the Proposed Action.	**NGS and Associated Facilities**. During continued operations between 2017 and 2019, there is limited potential for disturbance of soil resources because ground disturbance is likely to occur in areas that have already been disturbed. The potential for soil contamination from spills would remain due to facility activities, such as the storage of chemicals and fuels. If spills occurred, they would result in short-term localized impacts. Direct impacts related to retirement activities for the Proposed Action would be the same as those stated for the No Action alternative. Conducting retirement activities over a 5-year period as opposed to a 2- to 3-year period, as proposed under the No Action alternative, would delay the onset of soils recovering from retirement activities but would not generate impacts greater than those previously disclosed for the No Action alternative. **KM**. Soil salvaging, surface mining, and road or support facilities construction activities at the KM would result in the homogenization of native topsoil with subsoil, the loss of the original soil profile, and the short-term loss of soil productivity. Mining operations and haul road construction would also increase short-term erosion and soil impacts with erosion controls used to reduce the effects of surface disturbance. As a result of reclamation procedures, short-term impacts would occur for soil resources from surface disturbance that blends soil layers, resulting in long-term loss of the original soil profile. However, long-term impacts would be negligible since reclamation activities would restore the topography and improve the productivity of the soil structure. **STS and WTS on Navajo Tribal Trust Lands**. Continued operation of the transmission systems past 2019 represents a negligible short-term impact on soil resources. Operation and maintenance of the STS and WTS requires periodic aerial and ground inspections, repair and maintenance of infrastructure, maintenance of access routes, and treatment of vegetation within the ROW corridors. The procedures developed to maintain the systems avoid to the extent practical and minimize impacts on resources and the environment. Impacts from retirement would be the same as those under the No Action alternative.

Resource	No Action	Proposed Action
Solid and Hazardous Waste	**NGS and Associated Facilities**. Short-term impacts from solid and hazardous waste generated by the NGS would result from removal of NGS facilities and the catenary system for the railroad. Once retirement activities were completed, long-term impacts would be negligible. **KM**. Removal of mining facilities at the KM would initially produce large quantities of waste. Once reclamation activities were completed, long-term impacts would be negligible. **STS and WTS on Navajo Tribal Trust Lands**. Retirement of the transmission lines would generate solid and hazardous wastes. Once retired, generation of waste would cease. If the STS and WTS continue to be operated, impacts would be the same as those under the Proposed Action.	**NGS and Associated Facilities**. Continued operation of the NGS facilities would generate solid and hazardous wastes in similar quantities as those discussed in Section 3.7.3. Direct impacts would be negligible. During operations, accidental spills could occur, resulting in soil contamination in localized areas that would require removal of contaminated waste. Direct impacts related to retirement activities for the Proposed Action would be the same as those stated for the No Action alternative. Conducting retirement activities over a 5-year period as opposed to a 2- to 3-year period, as proposed under the No Action alternative, is not likely to alter the volume of wastes generated. Caps for the landfills would be maintained by the Lessees for 30 years, and the Restrictive Covenants would prevent disturbance to landfills, closed and capped ponds, and the ash disposal area in perpetuity to ensure erosion does not begin to expose the materials at the surface. **KM**. Indirect impacts from the KM operations would be short-term and negligible. Indirect impacts related to retirement activities for the Proposed Action would be the same as those stated for the No Action alternative but would be initiated about 2 years later. **STS and WTS on Navajo Tribal Trust Lands**. Continued operation and maintenance of the STS and WTS lines past 2019 would generate negligible quantities of waste that would be disposed of in compliance with applicable federal rules and regulations. Impacts from retirement would be the same as those under the No Action alternative.
Water Resources	**NGS and Associated Facilities**. Reducing NGS withdrawals from Lake Powell to less than 1,500 AFA for NGS retirement would result in a slight increase in storage volume and surface area. Water use at the NGS is subject to the 1969 Water Service Contract with Reclamation and water rights certificates issued by ADWR. When water use declines and ceases at the NGS, the rights to use water under the 1969 Water Service Contract and water rights certificates would revert to administration by Reclamation and ADWR, respectively, for other future uses and would be subject to the Nation's claims. Ceasing NGS operations would eliminate water leakage from plant processes. No degradation of water quality in the N-Aquifer is anticipated based on historical monitoring results. **KM**. Impacts from KM closure and reclamation on surface water quantity or quality in local washes and channels from the sediment ponds or any existing seeps would be "negligible to minor." Impacts on springs in the KM Permit Area would be "negligible to minor." The reduced pumping rate during reclamation would result in water levels recovering more quickly in the vicinity of the PWCC well field. The potential for leakage from the D-Aquifer into the N-Aquifer was estimated to be negligible. Potential impacts on Wepo Formation shallow aquifers would be "negligible to minor" because groundwater	**NGS and Associated Facilities**. Compared to the No Action alternative, the effect of 2 years of continued NGS operation would continue the historical amount of NGS water supply withdrawals ranging from about 19,000 AFA up to 29,000 AFA, resulting in a slight decrease in storage volume and surface area compared to the No Action alternative. After 2019, the effects on Lake Powell would be the same as those under the No Action alternative. Compared to the No Action alternative, the effect of 2 years of continued NGS operation would have no effect on water rights. Compared to the No Action alternative, the effect of 2 years of continued NGS operation may require up to a year or two of additional remedial pumping to remove any increase in perched water. No degradation of water quality in the N-Aquifer is anticipated based on historical monitoring results. **KM**. Mining and reclamation activities, surface water diversions, and the construction of temporary and permanent sediment impoundments would have "negligible to minor" short-term impacts on surface water quality and quantity. Because impacts on shallow groundwater aquifers would be "negligible to minor," impacts on springs from that formation in the KM Permit Area also would be "negligible to minor." Groundwater pumping from the N-Aquifer for mine uses would continue at an estimated rate of 1,200 AFA until mining ceases in 2019. Beginning in 2020, the annual pumping and impacts would be the same as described for the No Action alternative. Some leakage to the N-Aquifer would continue to occur from the D-Aquifer, but the effect on N-Aquifer water quality would be "negligible to minor." It is likely that there would be some minimal impact on local groundwater levels in the Wepo Formation and adjacent alluvial aquifers during mining. Changes in Wepo water levels due to mine dewatering would be long-term but limited to the local vicinity of the mine pit, resulting in "minor" impacts on the use of

Resource	No Action	Proposed Action
	quantity and quality impacts on the shallow aquifers as a result of mining at the KM to date have been negligible. Because impacts on surface water and groundwater resources would be "negligible to minor" as described above, impacts on alluvial aquifers would also be "negligible to minor." **STS and WTS on Navajo Tribal Trust Lands**. If the transmission systems are retired because no extended ROW is available, short-term unmeasurable effects on water quantity and quality in the ephemeral washes could occur as the towers, lines, and foundations are removed. Continued operation of the STS and WTS on Navajo Tribal Trust Lands would not have measurable effects on water resources.	the shallow groundwater system within the Permit Area. Potential impacts on shallow aquifer water levels and water quantity would also be "minor but long-term and limited to the Permit Area." Potential effects from acid-forming materials on groundwater quality would be expected to be "minor" due to the high carbonate content of the soils and limited to the Permit Area. **STS and WTS on Navajo Tribal Trust Lands**. On-the-ground transmission O&M activities avoid ephemeral washes and intermittent streams, especially when they are wet or flowing. No measurable effects on water quantity or quality would occur from the Proposed Action. Short-term unmeasurable effects would occur when the transmission systems and communication facilities are ultimately retired.
Special Status Species	**NGS and Associated Facilities.** Any reductions in terrestrial special status species habitat from increases in storage volume at Lake Powell would be imperceptible. The increase in storage volume could increase available habitat for special status aquatic species and increase dilution of contaminants, but these effects would likely be imperceptible. Demolition and deconstruction of the catenary system associated with the BM&LP Railroad would be a temporary source of disturbance to riparian habitat. Combustion of coal at the NGS would cease in 2017, and there would be no additional emissions impacts on special status species. Disturbance to riparian habitat from NGS retirement activities may affect special status species including southwestern willow flycatcher and western yellow-billed cuckoo. Implementation of measures in the NGS O&M Plan, such as monitoring for presence of species, implementing avoidance measures, and minimizing construction and vehicle use in riparian areas, would minimize impacts on special status species. ***Navajo Nation Endangered Species***. NGS retirement activities could result in short-term (2 to 3 years) habitat degradation or removal of Navajo Nation endangered species (NNE) including bald eagle, ferruginous hawk, golden eagle, or desert bighorn sheep, but these impacts would be inconsequential. The operator would coordinate with USFWS and the federal land manager to assure compliance with the MBTA and Bald and Golden Eagle Protection Act, as appropriate, if any raptor nests were found on NGS system infrastructure and needed to be removed. Retirement activities would increase noise and light pollution, but effects on these species and their habitat would be short-term	**NGS and Associated Facilities**. Under the Proposed Action, NGS operations (including emissions and pumping from Lake Powell) would continue for 2 years before retirement. Withdrawals by the NGS for water supply in 2018 and 2019 would result in a slight decrease (about 0.3 percent) in storage volume and surface area, which would have an imperceptible impact on terrestrial or aquatic special status species habitat. Impingement and entrainment effects on listed fish are highly unlikely. Emissions and other impacts om federally listed species including their habitat and, if present, designated critical habitat (CH) would be inconsequential to negligible to the following federally protected species: California condor (and its CH), Mexican spotted owl (and its CH), Southwestern willow flycatcher, Western yellow-billed cuckoo (and its CH), Bonytail (and its CH), Colorado pikeminnow (and its CH), Humpback chub (and its CH), Razorback sucker (and its CH), Brady pincushion cactus, Fickeisen plains cactus (and its CH), and Welsh's milkweed. Retirement of the NGS and associated facilities would be the same as for the No Action alternative, although it would occur 2 years later and extend for 5 years. ***Navajo Nation Endangered Species***. Continued operation of the NGS and associated facilities through December 2019 would not remove any habitat for NNE species. The effects of retirement activities would be the same as described for the No Action alternative. **KM**. In the Proposed Action, the KM would operate an additional 2 years before ceasing to operate by the end of December 2019; retirement activities would commence thereafter. Mexican spotted owls occur within the analysis area in the vicinity of the KM; however, mining and reclamation activities would not occur in occupied habitat. Indirect impacts related to retirement activities for the Proposed Action would be the same as those stated for the No Action alternative but would be initiated about 2 years later. Owls would be unlikely to be directly affected by mining- or reclamation-related operations, noise, or light disturbance given the distance of suitable habitat and implementation of KM BMPs. Reclaimed areas in the KM analysis area would be monitored twice annually for a period of 10 years to monitor the establishment of seeded vegetation and control of noxious weeds.

Resource	No Action	Proposed Action
	and inconsequential. **KM**. Reclaimed areas in the KM analysis area would be monitored twice annually for a period of 10 years to monitor the establishment of seeded vegetation and control of noxious weeds. Noise or light disturbance from KM retirement activities could have "negligible to minor" impacts on Mexican spotted owls; known PACs are located more than 0.5 mile from these activities. Owls would not likely be directly affected by noise or light disturbance given the distance of suitable habitat from retirement activities and the implementation of BMPs described in the KM EA, such as monitoring for the presence of Mexican spotted owls in potential habitat in the analysis area and implementing avoidance measures in occupied habitat or PACs. ***Navajo Nation Endangered Species***. KM retirement activities could result in short-term (2 to 3 years) degradation or removal of bald eagle, ferruginous hawk, golden eagle, or desert bighorn sheep habitat, but these impacts would be inconsequential. The operator would coordinate with USFWS and the federal land manager to assure compliance with the MBTA and Bald and Golden Eagle Protection Act, as appropriate, if any raptor nests were found on KM system infrastructure and needed to be removed. Retirement and monitoring activities would increase noise and light pollution, but effects on these species and their habitat surrounding the KM would be short- and long-term and inconsequential. **STS and WTS on Navajo Tribal Trust Lands**. If retirement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands occurs, there would be a temporary disturbance of approximately 1,280 acres. When the STS and WTS were retired, replacement of tower structures, removal of coil conductors, decommissioning of communication towers, retirement of the switchyard, and construction or improvement of access roads would not result in any appreciable effects on condors given their infrequent use of the STS and WTS corridors and the temporary nature of the activities. The Retirement Guidelines would include measures to minimize	***Navajo Nation Endangered Species***. Continued mining would generally occur in previously disturbed areas, and removal of undisturbed habitat would be minimal. The operator would coordinate with USFWS and the federal land manager to assure compliance with the MBTA and Bald and Golden Eagle Protection Act, as appropriate, if any raptor nests were found on KM system infrastructure and needed to be removed. Any bald eagles, ferruginous hawks, or golden eagles occurring in mined areas would likely be displaced into surrounding undisturbed or reclaimed habitat, which would be a short-term minor effect until reclamation replaced most wildlife habitat and the prey base returned. The effects on Navajo sedge, northern leopard frog, alcove bog-orchid, and alcove death camas from reductions in stream baseflow associated with N-Aquifer pumping for the KM would be expected to be inconsequential because the estimated changes in spring flow would be minimal or are not anticipated. **STS and WTS on Navajo Tribal Trust Lands**. Continued operations and maintenance of the STS and WTS would not result in any direct or indirect disturbance or impacts on special status species in the analysis area. Transmission lines and towers pose collision and electrocution risks to birds. These risks vary based on voltage and design configuration. The relative size of the STS and WTS towers and conductors (versus distribution lines) make these facilities highly visible, and the spacing between conductors far exceeds the wingspan of special status bird species. As stated in the NGS O&M Plan (SRP 2017d), as powerlines are replaced and maintained, installed equipment would meet the most current Avian Powerline Interaction Committee design standards to prevent bird electrocutions and collisions. Breeding California condors have been known to occasionally ingest small human-made materials and feed them to their nestling. The NGS O&M Plan also includes a measure to remove all debris and rubbish from work sites to minimize the likelihood of condors visiting work areas. Aerial inspections of the STS and WTS have potential to disturb California condors, Mexican spotted owls, southwestern willow flycatchers, and western yellow-billed cuckoo foraging or nesting near the transmission line during inspections. However, aerial inspections are conducted infrequently (once per year for the STS and once per 5 years for the WTS), and the disturbance is brief and unlikely to affect special status birds and raptors. Noise disturbances due to operations and maintenance activities, including helicopter patrols, would be temporary and localized and would occur during daylight hours when Mexican spotted owls are less likely to be foraging. No effects from continued STS operations and management on Fickeisen plains cactus and Welsh's milkweed or its habitat would occur, and ongoing effects would be inconsequential. BMPs for these species would reduce the likelihood of plant damage or crushing by requiring that biologically sensitive areas be marked and avoided, and that in these areas pre-activity surveys be conducted prior to vegetation management occurring in

Resource	No Action	Proposed Action
	effects of STS and WTS retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the Migratory Bird Treaty Act (MBTA) and ESA. Retirement of the transmission systems could result in disturbance of potential habitat for special status plant species, but effects would be imperceptible because disturbance would be limited previously disturbed areas. The Retirement Guidelines would include measures to minimize effects of STS and WTS retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the ESA. If the transmission systems on Navajo Tribal Trust Lands continue to be operated and maintained as they have historically, the impacts would be the same as those under the Proposed Action. ***Navajo Nation Endangered Species***. STS and WTS retirement activities could result in noise disturbance to NNE species or surface disturbance of NNE habitat. Disturbance would be temporary and would occur primarily in developed areas or areas where disturbance is ongoing. The Retirement Guidelines would include measures to minimize effects of STS and WTS retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the MBTA. Therefore, STS and WTS retirement would not result in any appreciable effects on NNE species. If STS and WTS operations and maintenance continued, the effects on NNE species would be the same as described for the Proposed Action.	the BM&LP Railroad and transmission line ROW corridors. In addition, vehicle use would be restricted to existing roads in suitable habitat, and clean vehicle practices would be implemented to reduce the spread of noxious weeds and invasive plant species. Retirement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands would temporarily disturb approximately 1,280 acres, and effects would be the same as those described for the No Action alternative. ***Navajo Nation Endangered Species***. No direct or indirect disturbance would result from ongoing inspection, maintenance, or repair of the STS and WTS during NGS operations. Bald eagles, ferruginous hawks, golden eagles, or desert bighorn sheep could be temporarily disturbed by helicopters during aerial inspections of the transmission line. Potential impacts on NNE species would be minimized through implementation of BMPs described in the NGS O&M Plan. As powerlines are replaced and maintained, installed equipment would meet the most current Avian Powerline Interaction Committee design standards related to raptor electrocutions and collisions. Aerial inspections of the STS and WTS have potential to disturb NNE species using the transmission line ROW corridors. However, aerial inspections are conducted infrequently (once per year for STS and once per 5 years for WTS), and the disturbance would be brief and unlikely to affect NNE wildlife species. In addition, vehicle use would be restricted to existing roads in suitable habitat, and clean vehicle practices would be implemented to reduce the spread of noxious weeds or invasive plant species that could degrade habitat quality for NNE species. Thus, impacts on NNE species resulting from STS and WTS maintenance activities would be inconsequential. The effects of STS and WTS retirement activities on NNE species would be the same as described for the No Action alternative. Reclamation and BIA conducted an effects analysis of listed species within the project area based on 2 years of NGS and KM operations; 35-plus years of STS and WTS operations; and NGS, STS, and WTS retirement. Reclamation and BIA made a determination of “may affect, not likely to adversely affect” for 10 federally listed species (including critical habitat for 4 of these species where applicable). Reclamation and BIA initiated informal Section 7 consultation with the USFWS on September 18, 2017. The USFWS responded with a memorandum dated October 20, 2017, in which they concurred with Reclamation's and BIA’s determination. This concurrence is Appendix 5 to the NGS Extension Lease EA-November 2017.
Fish and Wildlife	**NGS and Associated Facilities**. Demolition and decommissioning of structures, buildings, the railroad, and other facilities would result in short-term (2 to 3 years) habitat degradation or removal, but these impacts would be negligible due to the lack of undisturbed habitat in the areas, duration of disturbance, and implementation of BMPs described in the O&M Plan. The operator would coordinate with the USFWS and the federal land manager to assure compliance with the MBTA and Bald and Golden Eagle Protection Act, as	**NGS and Associated Facilities**. Continued operation of the NGS and associated facilities through December 2019 would not remove any wildlife habitat. Maintenance, repair, and replacement activities would occur less often, slightly reducing effects of noise, light, and other disturbance on wildlife during operations. The effects of demolition and decommissioning of NGS structures, buildings, the railroad, and other facilities on wildlife would be the same as described for the No Action alternative. The Proposed Action would not directly affect fish or other aquatic species because none of these species occur in the direct effects analysis areas and because the Proposed Action would not affect habitat for these species.

Resource	No Action	Proposed Action
	appropriate, if any raptor nests were found on system infrastructure and needed to be removed. Surveys for active migratory bird nests would be conducted prior to herbicide treatment in dense vegetation during the migratory bird breeding season, and destruction of or disturbance to any active nests found in the analysis areas would be avoided. Construction and vehicle use in riparian areas would further minimize impacts on migratory birds and other wildlife. Speed limits on access roads would minimize vehicular collisions with wildlife. Where NGS facilities were removed, habitat would be improved or restored in the long term after reclamation and revegetation was complete. Retirement activities would increase noise and light pollution, resulting in slight, short-term effects on wildlife, lasting until reclamation activities were complete. Limited disturbance would continue during long-term monitoring activities. When the NGS ceases to operate, water requirements at the plant would be 5 to 10 percent of the amount that the NGS has historically used from Lake Powell. After demolition and earthmoving activities are completed, NGS water withdrawals from Lake Powell would cease. Reducing NGS withdrawals from Lake Powell would result in a slight increase (about 0.3 percent) in storage volume and surface area. The Lake Powell storage volumes fluctuate seasonally and from year to year, depending on inflow and dam releases. Any reductions in terrestrial wildlife habitat from increases in storage volume at Lake Powell would be negligible. The increase in storage volume could also increase available habitat for aquatic species and increase dilution of contaminants, but these effects would likely be imperceptible. **KM**. Reclamation at the KM would include revegetation of previously disturbed areas. Reclaimed areas and restored habitat would result in beneficial effects on fish and wildlife. These areas would be monitored twice annually for a period of 10 years for establishment of seeded vegetation and control of noxious weeds. Some groundwater pumping would occur for reclamation. Based on groundwater monitoring of the N-Aquifer, water withdrawal has not had substantial impacts on riparian areas downstream of the KM Permit Area. During reclamation, the rate of pumping would be reduced, allowing recovery of water levels.	Under the Proposed Action, withdrawals from Lake Powell would continue for about 2 years. Withdrawals by the NGS for water supply in 2018 and 2019 would result in a slight decrease (about 0.3 percent) in storage volume and surface area. Lake Powell storage volumes fluctuate seasonally and from year to year, and plants, wildlife, and fish are adapted to these changes. Any reductions in terrestrial or aquatic habitat due to reductions in storage volume at Lake Powell as a result of NGS withdrawals would not be measurable. Because the intake system is in a deep area of Lake Powell where fish population densities are low, there would be a slight effect of the water intake system on the entrainment or impingement of fish. After 2019, the effects of Lake Powell withdrawals on fish and wildlife would be the same for the Proposed Action and the No Action alternative, except that pumping would continue for 2 years. The indirect impacts of groundwater pumping of the N-Aquifer would also be the same for both alternatives, which is negligible. Impacts of NGS emissions on fish and wildlife were evaluated in ecological risk assessments (ERAs) for the Proposed Action. The Near-Field ERA looked at a scenario with the maximum output of the NGS combined with the baseline and the potential impacts on terrestrial wildlife and non-special status aquatic species. It determined that the maximum output from the NGS over the 5-year renewal period would not pose unacceptable risks to wildlife species or their habitat or to aquatic species or their habitat from constituents of primary concern (e.g., mercury, selenium, and other pollutants). **KM**. Reclaimed areas in the KM analysis area would be monitored twice annually for a period of 10 years to monitor the establishment of seeded vegetation and control noxious weeds. Continued mining would occur in previously disturbed areas designated by the renewal lease, and removal of undisturbed habitat would be minimal. Wildlife occurring in the affected coal resource areas (CRAs) would likely be displaced into surrounding undisturbed or reclaimed habitat, which would be a short-term effect until reclamation replaced most wildlife habitat. Where disturbance occurred in rocky terrain, habitat would be regraded to more gentle and rolling topography before reclamation, resulting in removal and replacement of that habitat type with early successional vegetation communities. Effects of noise, light, and other disturbance associated with mining activities could disturb wildlife that use the KM Permit Area, but wildlife would likely avoid active mine areas and mining roads with frequent human activity. Vehicles and human activity could induce raptors to exhibit agitated behavior or flush from a perch site. This could increase energetic demands but would not result in reduced fitness of individuals because of the limited frequency and duration of use of the analysis areas. After mining ceased, noise and light pollution would decrease, reducing disturbance to wildlife. **STS and WTS on Navajo Tribal Trust Lands**. Continued operation and maintenance of the STS and WTS would not result in any direct or indirect disturbance to fish and wildlife, and ongoing existing effects would be negligible because BMPs, including avian collision and electrocution avoidance measures, would continue to be implemented and no new construction would occur. As powerlines are replaced and maintained, installed equipment would meet the most current Avian Powerline Interaction Committee design standards

Resource	No Action	Proposed Action
	STS and WTS on Navajo Tribal Trust Lands. Retirement of the STS and WTS could result in noise disturbance to wildlife or surface disturbance of habitat. Disturbance would be temporary and would occur primarily in previously disturbed areas. New disturbance would be limited to modification of portions of the access roads and storage and staging areas. The Retirement Guidelines would include measures to minimize effects of STS and WTS retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the MBTA. Therefore, STS and WTS retirement would not result in any appreciable effects on fish and wildlife. If STS and WTS operations and maintenance continued, the effects on fish and wildlife would be the same as described for the Proposed Action.	related to raptor electrocutions and collisions. Aerial inspections of the STS and WTS have potential to disturb wildlife species using the transmission line ROW. However, aerial inspections are conducted infrequently (once per year for the STS and once per 5 years for the WTS), and the disturbance is brief and unlikely to affect wildlife. In addition, vehicle use would be restricted to existing roads in suitable habitat, and clean vehicle practices would be implemented to reduce the spread of noxious weeds or invasive plant species that could degrade habitat quality. Thus, impacts on fish and wildlife resulting from STS and WTS maintenance activities would be imperceptible. The effects of STS and WTS retirement on fish and wildlife would be the same as described for the No Action alternative.
Vegetation	**NGS and Associated Facilities**. No additional ground disturbance caused by operation and maintenance would occur at the NGS and associated facilities, and there would be no direct effects on vegetation. Up to 1,760 acres associated with the plant site and ash (CCR) disposal area would be reclaimed (additional acreage would be reclaimed if the Nation elects not to accept certain facilities such as the lake pump facility or other facilities). Demolition and decommissioning of NGS structures, buildings, the catenary system, and other facilities could result in short-term (2 to 3 years) degradation or removal of vegetation communities. Where NGS facilities were removed, native plant communities would be improved or restored with like native species in the long term after reclamation and revegetation was complete. Given the small proportion of reclaimed areas relative to surrounding undisturbed areas, effects on vegetation of converting the existing vegetation communities in the NGS analysis area to the reclaimed vegetation community would be long-term but inconsequential. Retirement activity contractor vehicles could temporarily increase the potential for noxious weed and invasive plants establishment in the short term. With implementation of BMPs, the No Action alternative would result in slight long-term impacts. Disturbance of vegetation could also occur during long-term monitoring activities, but effects on vegetation would be negligible. Clean vehicle practices would be implemented to reduce the spread of noxious weeds or invasive plant species. Any changes in wetland or riparian vegetation from increases in	**NGS and Associated Facilities**. Similar to the No Action alternative, in the Proposed Action, no additional ground disturbance would occur and no vegetation would be removed during continued operation of the NGS and associated facilities through December 2019. Some temporary degradation of vegetation could occur during ongoing maintenance, repair, and replacement activities, but these effects would be negligible. Based on implementation of BMP measures including a Dust Control Plan, dust-related effects on vegetation from operations and maintenance activities under the Proposed Action would be negligible. Effects on vegetation from reducing NGS withdrawals from Lake Powell during NGS retirement would be the same for the Proposed Action and the No Action alternatives. The indirect impacts on vegetation from groundwater pumping of the N-Aquifer would also be the same for both alternatives, which would be negligible. **KM**. Continued mining through the end of December 2019 would be limited to the KM Permit Area and would generally occur in previously disturbed areas, and removal of undisturbed habitat would be minimal. The amount of reclaimed vegetation during mining and reclamation under the Proposed Action would be the same as under the No Action alternative, resulting in long-term negligible effects on vegetation. **STS and WTS on Navajo Tribal Trust Lands**. Continued operations and maintenance of STS and WTS would not result in any direct or indirect disturbance to vegetation, and ongoing effects would be negligible because no new construction would occur and because most affected areas would already be disturbed. Effects of transmission line or communication site O&M on vegetation would be minimized through the BMPs described in the O&M Plan (SRP 2017d). In addition, vehicle use would be restricted to existing roads in suitable habitat, and clean vehicle practices would be implemented to reduce the

Resource	No Action	Proposed Action
	storage volume at Lake Powell would be negligible. **KM**. Over the long term, reclaimed vegetation in the KM analysis area would increase by about 6 percent. Given the relatively small proportion of reclaimed areas, converting mined areas to the reclaimed vegetation community would result in long-term negligible direct effects on vegetation. In the short term, disturbed and reclaimed areas in the KM analysis area would be susceptible to invasion by noxious weeds and other invasive plant species from regrading, spreading topsoil, and reseeding areas disturbed by mining activities, as well as livestock grazing. With reclamation and mitigation efforts, potential establishment of invasive plant species or noxious weeds would be temporary and highly localized, resulting in minor impacts on vegetation. Impoundments developed in association with the affected Coal Resource Areas and reclamation sites could augment the small number of riparian areas present at impoundments in previously mined areas in the KM Permit Area. The impacts on riparian vegetation from the various water impoundments would be negligible. Impacts of the No Action alternative on riparian vegetation from water withdrawal from the N-Aquifer for mining activities would be negligible. **STS and WTS on Navajo Tribal Trust Lands**. Disturbance from retirement of the STS and WTS would be temporary and would occur primarily in developed areas or areas where disturbance is ongoing. New disturbance would be limited to modifications of access roads and creation of storage and staging areas. The Retirement Guidelines include measures to minimize effects of STS and WTS retirement. Therefore, STS and WTS retirement would not result in any appreciable effects on vegetation. If STS and WTS operations and maintenance continued, the effects on vegetation would be the same as described for the Proposed Action.	spread of noxious weeds or invasive plant species that could degrade habitat quality. Thus, impacts on vegetation resulting from STS and WTS maintenance activities would be imperceptible. The effects of STS and WTS retirement would be the same as described for the No Action alternative.
Land Use and Recreation	**NGS and Associated Facilities**. The reclamation, monitoring, and subsequent potential restricted uses of the leased areas would have long-term and both beneficial and adverse effects on land use within the Navajo Tribal Trust Lands. The Nation would likely restrict land use to prohibit residential, agricultural, and most other uses where human exposure to contaminants could occur. The most likely use for the NGS after reclamation	**NGS and Associated Facilities**. The Extension Lease contains Restrictive Covenants that would limit the use of the waste disposal landfills located on the NGS after retirement and reclamation in order to protect human health and safety. The ash (CCR) disposal area, solid waste landfill, and pond solids areas would be capped, covered, and left in place. The covenants would limit the land use at these locations in order to prevent disturbance to the cover, liners, and containment components. These restrictions would be permanent, affecting a total of 644 acres. In addition to Restrictive Covenants, the Extension Lease and

Resource	No Action	Proposed Action
	activities is industrial development. It is likely that traditional uses of the area, including grazing, would not be permitted at the NGS in perpetuity. Navajo who have traditional ties to the area would be restricted from accessing it for many generations and would not be permitted to graze cattle and sheep there. Future industrial use of the previously disturbed area may be beneficial to the Nation's economy and infrastructure. No future uses of the ash disposal area (CCR) would be permitted. The removal of the NGS facilities would have a negligible long-term beneficial effect on the surrounding recreation economy. Upon removal, the NGS facilities would no longer be in the viewshed of Glen Canyon National Recreation Area and Antelope Canyon Tribal Park, which would result in a more aesthetic viewshed for recreationists. NGS retirement may have adverse effects on the local recreational economy. The loss of personal and family income for those who are employed directly or indirectly by the NGS may result in reduced ability for these employees and their families to participate in local recreation activities. Population and demographic changes resulting from NGS retirement may affect recreation resources, as individuals and families move away from the area to seek employment elsewhere and the workforce is reduced. Local businesses that cater to tourism during the peak season (from about mid- to late March through August) also benefit from out-of-town NGS contractors during the tourism off-season. **KM**. After reclamation, land use would be restored to the pre-mine uses. The No Action alternative would result in long-term beneficial effects on the residential and traditional uses of the area by the Navajo and Hopi communities. Dispersed recreational activities on Black Mesa would include the reclaimed areas within the KM. Local and transient wildlife populations may increase due to the lack of mining disturbance and successful reclamation as a result of the No Action alternative. Tribal members would be allowed to recreate on the reclaimed areas after closure. This would result in a long-term, beneficial effect on recreation resources. **STS and WTS on Navajo Tribal Trust Lands**. It is likely the NGS Lessees and the Nation would enter a separate agreement	the § 323 Grant would require the Nation to conduct additional analysis and remediation if the areas are used for uses other than industrial purposes, in order to reduce risk to human health and public safety. The area that would be subject to the Restrictive Covenants is about 0.003 percent of the total Navajo Tribal Trust Lands area. The NGS area that would be subject to restrictions under the Extension Lease and the § 323 Grants would be up to 0.02 percent of the total Navajo Tribal Trust Lands area. Reclamation, monitoring, and subsequent restricted uses of the leased areas would have long-term adverse and beneficial effects on land use within the Nation as a whole and on the local communities and chapters. Navajo who have traditional ties to the area would be restricted from accessing most of the NGS for many generations and would not be permitted to graze cattle and sheep there (see Section 3.14, Cultural Resources). The return of the NGS plant site and the retention of certain NGS buildings and facilities, as negotiated under the Extension Lease, would benefit the Nation and local communities by providing infrastructure for future industrial development. The effects on recreation resources would be the same under the Proposed Action alternative as under the No Action alternative, except that the timing of effects would coincide with the retirement and reclamation schedule for the Proposed Action. **KM**. The effects would be the same as under the No Action alternative, except that mine closure and final reclamation activities would be delayed by 2 years, and the return of traditional land use would be similarly delayed 2 years. **STS and WTS on Navajo Tribal Trust Lands**. Under the Extension Lease (and § 323 Grants), the STS and WTS would continue to be operated and maintained for 35 to 70 years. The Lessees would be responsible for O&M costs for 10 years, after which the Nation would be responsible for O&M costs for their use and capacity. The Lessees would be responsible for retirement and restoration after the lease expires. Jack's Peak and Preston Mesa communication sites would continue to be operated and maintained. The Zilnez Mesa site would be retired along with the NGS. Upon expiration of the Extension Lease (or its renewal), 1,280 acres associated with the STS and WTS would undergo short-term disturbance while structures are removed and the area re-contoured and reseeded. After reclamation is complete and vegetation is successfully established, future use of the area may include livestock grazing and other traditional land uses. Long-term effects would be beneficial.

Resource	No Action	Proposed Action
	for the continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands (see Proposed Action). In the event an agreement cannot be reached, the 1,280 acres associated with decommissioning of the STS and WTS would undergo short-term disturbance while structures are removed and the area re-contoured and reseeded. Upon completion of retirement activities, all of the ROW would be returned to the Nation. After reclamation is complete and vegetation is successfully established, future use of the area may include livestock grazing and other traditional land uses. All three communication sites would be retired, and transmission-related equipment and infrastructure would be removed and disturbed areas reclaimed, but the sites would continue to be used by other agencies and companies. Long-term effects would be beneficial.	
Public Health and Safety	**NGS and Associated Facilities**. Air quality and health risk impacts during retirement activities would be localized and limited to the period in which retirement activities occur. Furthermore, BMPs for dust control would be adopted to minimize emissions, protect air quality, and reduce health risk impacts. Retirement of the NGS would eventually eliminate criteria and hazardous pollutant emissions from the facility. This would result in a long-term beneficial effect. The long-term ambient air quality would improve; however, the economic effects from NGS retirement would result in reductions of revenues and income within the analysis area, which would have a long-term, adverse effect on community health. Noise from retirement activities would include blasting, deconstruction of the buildings, earthwork and civil engineering to remove ponds and other infrastructure, closing and capping of ponds and landfills, grading of the site, removal of the railroad catenary, and truck traffic for salvage material disposal. The nearest noise-sensitive receptors to the NGS are four scattered residences approximately 1 to 2 miles to the southeast near Arizona Highway 98, and a residence located 0.5 mile south of the Antelope Canyon Tribal Park entrance 0.75 mile west of the lake pump facility at Lake Powell. At these distances, no noise impacts are anticipated that would affect sensitive receptors. Hazardous materials and solid waste impacts due to retirement activities would be negligible because removal and cleanup of potential contaminants; cap and closure of the CCR, ponds, and	N**GS and Associated Facilities**. The Proposed Action would result in a continuation of existing emissions and impacts for 2 years beyond the No Action alternative. The results from the Human Health Risk Assessment (HHRA) were within the acceptable EPA cancer risk range, and noncancer effects for all Hazard Indexes (HI) were less than the benchmark of 1. Though the maximum impacts associated with proposed NGS operations could increase the current 24-hour and annual $PM_{2.5}$ concentrations, the maximum cumulative impact on 24-hour and annual $PM_{2.5}$ concentrations would still meet the NAAQS criteria. Noise from the NGS operations would not change from baseline conditions. Sound levels would not approach levels that have been associated with hearing impairment. No noise impacts from the 2 years of NGS operation would occur outside the plant boundaries as there are no sensitive receptors within 0.5 mile of the NGS or 200 feet of the BM&LP Railroad. The public health evaluation concluded that potential effects from all project components would result in potential positive health impacts on the general population of the affected community from an additional 2 years of employment, income, and revenues from the NGS and the KM. The 2 years of NGS operations may result in increased risk of an accident or event that would result in risk of exposure to sensitive receptors or the public; however, NGS must comply with the regulations and public safety procedures in Appendix 2 of the EA; therefore, there would be a low likelihood of accidents or risk exposure occurring and a low magnitude of consequence. The effects on public health would be negligible and short-term. The long-term effects would be identical to those under the No Action alternative after the NGS is retired. Once NGS operations cease, the long-term human health effects would be identical to those

Resource	No Action	Proposed Action
	solid waste landfills; removal of the asbestos landfill; and remediation of the site to industrial standards would contribute to overall restoration of the site and reduce the risk of exposure to sensitive receptors in the future. There would be a short-term increase in truck traffic during demolition. Handling, transport, and disposal of all regulated materials would follow federal or other applicable regulations for public health and safety including USDOT and ADOT regulations and, thus, impacts are expected to be minimal. **KM**. Decommissioning and reclamation activities would result in some emissions from heavy machinery, but these activities would be short-term and confined within the boundaries. The No Action alternative would result in the elimination of chemical of potential concern (COPC) and PM emissions from the KM, thus eliminating any cancer and noncancer risk to sensitive receptors in the analysis area after the KM ceases operations. Air emissions sources and health risk impacts would be similar to those described above for NGS retirement and would be localized and only occur during closure and reclamation activities. The public health evaluation does identify some level of short-term adverse health impacts associated with the No Action alternative, particularly associated with noise and vibration nuisances that could impact the psychosocial state and overall well-being of the community. However, these potential impacts are likely negligible relative to the lifestyle risk factors that are contributing to the general health of the community, and they would be reduced or eliminated as the KM closes in response to NGS retirement. Also, relocations of residents within the KM boundary would cease, and there may be potential for relocated residents to return to their former lands after reclamation, which may result in greater well-being as traditional land is returned to families. Similarly, the restoration of grazing land would result in minor long-term beneficial effects on community health as residents are allowed to return to traditional lands and grazing land quality is improved. During the closure activities of the KM, PWCC would continue to comply with all applicable federal, tribal, and state rules and regulations regarding health and safety and the handling and disposal of explosives and hazardous materials and wastes.	under the No Action alternative. Transportation of hazardous materials and solid waste would follow federal and ADOT regulations and impacts are expected to be minimal. Public safety impacts from railroad operation are expected to be minimal because of routine maintenance of the railroad track structure, catenary system, crossing locations/gates, signals, signage, right-of-way roads, water drainage, and cattle guards to ensure the safety of train operations, public safety, and prevent livestock from accessing the right-of-way. **KM**. Cancer and noncancer risk estimates were below the benchmark values; thus, they required no further evaluation. Human health impacts from KM operations under the Proposed Action would be negligible. The Proposed Action would result in negligible short-term adverse public health effects for 2 years of continued mining. A possible exception would be the potential health impacts on the sensitive subpopulations with existing conditions that could be exacerbated by slight increases in PM2.5 emissions. The long-term effects on public health would be the same as those under the No Action alternative following mine closure. Sensitive noise receptors, including residents who live near or within the KM permit boundaries, near mine roads, and within range of warning signals for blasting during mining operations, would continue to experience noise from mining activities under the Proposed Action. However, these effects would be short-term because KM operations would cease before the NGS is retired, and reclamation activities would commence. The current health and safety practices at the KM would continue. Regulatory changes in health and safety requirements would be included in standard operating procedures, and compliance with mandated safety rules would continue to be required. Similar safety risks would continue to be present. The opportunity for accidents due to working directly with or close to large equipment would also be present. Blasting operations would continue with pre-blast surveys conducted as requested. The mine would continue to provide emergency health care services to the workforce and local residents, and neither the type nor quantity of any wastes generated and disposed of by the mine would change. These impacts on public health and safety would be negligible. Transportation of hazardous materials would follow federal and state regulations. The risk of a transportation incident with hazardous materials would be similar to that under the No Action alternative, but would be slightly increased due to the additional period of operation compared to the No Action alternative. Once the KM mining operations cease in response to NGS retirement, the long-term effects would be identical to those under the No Action alternative. **STS and WTS on Navajo Tribal Trust Lands**. Maintenance activities for the

Resource	No Action	Proposed Action
	Safety procedures regarding truck traffic would continue to be observed during reclamation activities, although fewer vehicles would be required for these activities. After the reclamation period, PWCC would no longer assist with Navajo Route 41 roadway maintenance or provide dust control measures. Emergency health care and first responder services provided by the mine would continue during the reclamation period but would cease following the completion of reclamation activities. The most used product at the KM is diesel fuel, and the risk of a transportation incident would be eliminated as the KM ceases operations and completes reclamation activities under either alternative. If an accident resulting in a release should occur during reclamation activities or before the mine operations cease, the effects would be anticipated to be negligible to minor depending on the location of the release. **STS and WTS on Navajo Tribal Trust Lands**. Retirement of the STS and WTS would likely result in localized emissions along the transmission lines and access roads from vehicle traffic and equipment use (vehicle exhaust and fugitive dust from unpaved roads). However, these activities would be of short duration and localized. Therefore, emissions from retirement would be minimal, and the public health impacts would be negligible. Impacts from electrical fields, magnetic fields, or noise associated with the STS and WTS would cease under the No Action alternative once there is no longer power transmission and retirement is complete. Under the No Action alternative, the major products used would consist of petroleum fuels and other materials related to vehicle maintenance. These activities would result in minimal effects from hazardous waste on public or human health, as they would not result in changes to the baseline conditions. If the STS and WTS continue to be operated, the impacts would be the same as described under the Proposed Action.	transmission lines, communication sites, and access roads would result in exhaust emissions and fugitive dust emissions from vehicle traffic on unpaved roads. However, these activities would be infrequent, of short duration, and localized, and impacts on health and safety would be minimal. When the STS and WTS are retired, the long-term effects would be the same as those under the No Action alternative.
Cultural Resources	**NGS and Associated Facilities**. Because the No Action alternative is not a federal undertaking, Section 106 compliance would not be required, and potential effects on historic properties from the No Action alternative would not be further considered. Because of the Covenants Not to Regulate under the	**NGS and Associated Facilities**. The Proposed Action is a federal undertaking that requires compliance with Section 106 of the NHPA. Reclamation would serve as lead federal agency for undertakings that take place on Nation lands. Specific requirements pursuant to Section 106 would be addressed by Reclamation, and would consider the potential effects on historic properties from the Retirement Plan. Once areas that are anticipated to be

Resource	No Action	Proposed Action
	Existing Lease, the Navajo Nation Cultural Resources Protection Act would not apply. Because the NGS facilities not retained by the Nation would be removed by 2020, they would not meet the 50-year age criterion; thus, retirement activities under the No Action alternative would have no effect on historic properties. In discussions with SRP, the Nation has indicated that they would likely preserve in place the BM&LP Railroad; the associated catenary would be removed, however. Per the Class I Inventory, the entire railroad ROW was subject to survey, documenting between 62 and 65 cultural resources. Construction of the railroad likely destroyed much of the original ground surface within the ROW, limiting or even precluding the potential for intact historic properties. Regardless, because the Nation has indicated that they will preserve the railroad in place, no effects on historic properties within the ROW are anticipated. One communication site, Zilnez Mesa, is not shared and would be removed and restored as part of the NGS. The presence of historic properties within the communication site remains unknown. If the communication site is to be removed, an inventory to identify and evaluate potential effects on historic properties would be conducted if necessary by SRP or APS, operator of the Zilnez communication site. If historic properties could not be avoided, SRP or APS would consult with the Nation and BIA, as appropriate, to mitigate the impacts. **KM**. The results of the Class I Inventory indicate that, although a previous survey occurred within the coal conveyor easement and associated equipment disturbance areas, there is little to no supporting data to identify whether historic properties exist within the ROW of KM components. Therefore, retirement activities would have an unknown effect on historic properties within the KM components. Reclamation activities within mined or otherwise disturbed areas of the KM have been subject to Section 106 compliance precluding further compliance measures. Unanticipated discovery protocol agreed to with the Nation and the Hopi would remain in place during reclamation activities. **STS and WTS on Navajo Tribal Trust Lands**. The STS has 58 potential historic properties within the 200-foot ROW on Navajo Tribal Trust Lands. If retired, potential ground-disturbing activities would include structure removal, activity	disturbed by retirement activities have been identified through the process described in the Extension Lease, a Class III survey would be undertaken as part of the Section 106 consultation. The Section 106 consultation would involve coordination with other interested tribes including, but not limited to, the Hopi Tribe and Pueblo of Zuni. Section 106 consultations would be undertaken prior to any land-disturbing activities. Retirement activities that cannot avoid historic properties would be evaluated for project effects prior to any land-disturbing activities, and any adverse effects would be resolved under a memorandum of agreement among the lead federal agencies, the Navajo Nation, SRP, and appropriate consultation parties. Operations and maintenance would continue during the 2 years of NGS operation, but these activities are considered by Reclamation to have no potential to affect historic properties. Because the NGS facilities not retained by the Nation would be removed by 2021, they would not meet the 50-year age criteria for potential historic properties. Any decision to consider potential effects under Criterion Consideration G would be made by Reclamation. Potential effects on historic properties from retirement activities within the ROW of the BM&LP Railroad would be the same as those under the No Action alternative. Therefore, there would be no effect on historic properties within the ROW during retirement (removal of the catenary and associated equipment). During operations between 2018 and 2019, activities would occur in areas that have been previously disturbed; thus, no effects on historic properties are anticipated. Potential effects on Zilnez Mesa would be the same as those under the No Action alternative. Prior to decommissioning and removal, the communication site would be evaluated pursuant to Section 106. **KM**. Section 106 compliance for the KM has been concluded. Unanticipated discoveries could occur during continued mining operations and remediation activities; effects on unknown historic properties would be short-term and adverse. Potential discoveries would be mitigated per existing Nation policy. Continued operations and remediation of the KM would continue to affect Black Mesa as a traditional cultural property (TCP). However, effects on Black Mesa from the KM have already occurred. Once KM operations cease, reclamation and remediation activities would continue to adversely affect Black Mesa as a TCP. However, once reclamation and remediation activities have been completed, the effect of the Proposed Action on Black Mesa would be beneficial in the long term, including recharging the N-Aquifer, restoring the natural environment through reclamation, and restoring traditional land use. **STS and WTS on Navajo Tribal Trust Lands**. Routine O&M of the transmission systems over the life of the Extension Lease will mirror existing O&M activities. If actions exceed current O&M activity types, or affect access roads that have not been previously surveyed,

Resource	No Action	Proposed Action
	staging within the ROW, and the use and improvement of access roads. The types of activities associated with line and structure removal could be planned to avoid adverse effects on potential historic properties. However, access roads and activity staging may require inventory to identify and evaluate potential effects on historic properties. If historic properties could not be avoided, APS, operator of the STS, would consult with the Nation and BIA, as appropriate, to mitigate the impacts. No historic properties are located within the WTS ROW on Navajo Tribal Trust Lands. Access roads and activity staging may require inventory to identify and evaluate potential effects on historic properties. If historic properties could not be avoided, LADWP or NVE, operators of the WTS, would consult with the Nation and Reclamation, as appropriate, to mitigate the impacts. It is unlikely that the two communication sites would be removed because the Jack's Peak and Preston Mesa communication sites are shared with other operators and the access roads serve purposes other than the NGS; rather, the communication sites would be decommissioned with little to no ground disturbance. The presence of historic properties within the two communication sites is unknown. If the communication sites are to be removed, an inventory to identify and evaluate potential effects on historic properties would be conducted by APS, operator of the STS, if necessary. If historic properties could not be avoided, APS would consult with the Nation and BIA, as appropriate, to mitigate the impacts. Continued operation and maintenance of the STS and WTS would result in the same effects as those under the Proposed Action.	then the process outlined in Section 106 of the NHPA would be followed. When retirement of the transmission systems is considered, Reclamation would then determine if it has an action to take. Potential effects on historic properties from decommissioning of the communication sites would be the same as those under the No Action alternative. Prior to decommissioning and removal, both communication sites would be evaluated pursuant to Section 106.
Socioeconomics and Environmental Justice	**NGS and KM**. Adverse socioeconomic impacts in northeastern Arizona that would result from NGS closure would be widespread and long-term. Because the NGS and the KM are among the largest private sector employers in northeastern Arizona, the effects would extend to Coconino, Navajo, and Apache Counties and throughout the state. The subsequent loss of existing jobs and income and reductions in revenues paid to the tribes and local governments would result in adverse effects on the socioeconomic environment, given the persistently high unemployment and poverty rates on the Nation and the Hopi Reservation and the importance of the revenues that support tribal enterprises, government employment, and social and	**NGS and KM.** The Proposed Action would allow 2 extra years of tribal revenue and employment of Navajo and Hopi and other northeastern Arizona residents. The additional 2 years of labor income and revenues would allow time for the implementation of a transition strategy that would offset some of the overall adverse impacts of closure and retirement of the NGS and the KM on the tribes and communities. The Proposed Action alternative would provide benefits that the No Action alternative would not. These include: • Up to $323 million in rent, other payments, and in-kind value to the Nation • $39 million of minimum coal royalties to the Nation and possibly $19 million to the Hopi Tribe

Resource	No Action	Proposed Action
	government services throughout the reservations. NGS closure would also result in the loss of contributions to NGS plant reclamation and retirement costs and to retiree health care. There are no reasonably foreseeable new industrial or commercial developments that might offset or reduce the effects. The greatest local economic and social implications of the NGS closure would be experienced in the Nation chapters and Hopi communities where NGS and KM workers live; the city of Page, where many NGS workers live and a substantial proportion of indirect and induced effects from the NGS are experienced; Window Rock, where the Nation's tribal headquarters are located; and Kykotsmovi, where the Hopi Tribe headquarters are located. Local businesses in Page would experience the loss of business from annual overhauls at the NGS and the year-round induced economic benefits from NGS worker spending. The adverse socioeconomic effects of the alternatives would be experienced disproportionately by environmental justice populations, as the Nation and Hopi Tribe would be directly affected and are predominately Native American Indian and live in communities with high rates of poverty. **STS and WTS on Navajo Tribal Trust Lands.** Under the No Action alternative, the STS and WTS on Navajo Tribal Trust Lands would be retired along with the NGS, unless a separate agreement is executed with the Nation that would allow continued O&M of the transmission systems. Decommissioning would begin in 2018 and would be completed by 2020, under the terms of the Existing Lease. Retirement and restoration activities would not be expected to result in additional local employment, changes in population, housing demand, demands for public facilities and services, or changes in fiscal conditions. The Lessees would be responsible for the decommissioning costs. **Pueblo of Zuni**. The analysis area for the Proposed Action and No Action alternatives falls within what the Zuni consider to be their ancestral lands. No specific traditional or ongoing cultural use of these areas has been identified by the Pueblo of Zuni; however, as a whole, "these lands and their innumerable environmental resources continue to play fundamental roles in the health and wellbeing of the Zuni cultural environment and they retain intensive ongoing traditional religious and cultural	• $522 million in direct and indirect labor income in the region through 2019 • An additional $10.2 million per year of induced economic benefits to northeastern Arizona communities • Additional time for the Nation and Hopi Tribe to explore and develop economic development alternatives • 500 MW of transmission line capacity to the Nation for 35 to 75 years • Greater Nation input and monitoring of retirement activities • Nation retention of some additional NGS buildings for future uses • Guaranteed hiring preference for Navajo during retirement activities Beneficial effects on environmental justice populations would result from the 2 additional years of economic benefits from NGS and KM operations; however, for those community members who want those operations removed, there would be a 2-year delay in shutting down operations. **STS and WTS on Navajo Tribal Trust Lands.** The Proposed Action would allow the continued O&M of the STS and WTS for 35 years with right of extension for an additional 35 years, and would provide the Nation 500 MW of transmission capacity for their use and benefit. The Extension Lease and § 323 Grants would allow the STS and WTS to continue to be operated and maintained through 2054 with an option to extend through 2089 or to decommission by 2056 (see Section 2.3, Proposed Action). Reclamation would grant the Nation use and capacity of 300 MW on the STS and 200 MW on the WTS, with O&M costs paid by the Lessees until 2029. No new construction on the STS or WTS within Navajo Tribal Trust Lands is foreseen before decommissioning begins. The O&M costs for the STS are estimated to be $28,000 per mile per year, and costs for the WTS are estimated to be $15,000 per mile per year. After 2029, the Nation would be responsible for O&M costs of up to approximately $2.8 million per year for the STS (101 miles) and $30,000 per year for the WTS (1.8 miles) (Smith 2017b). Ultimately, the Lessees would be responsible for decommissioning, removal, and reclamation costs as described for the No Action alternative. O&M activities would not be expected to result in additional local employment, changes in population, housing demand, demands for public facilities and services, or changes in fiscal conditions. Continued operation of the STS and WTS may provide needed infrastructure for future development at the NGS. The effects of the Proposed Action as it relates to the STS and WTS would be long-term and beneficial. **Pueblo of Zuni**. Under the Proposed Action, NGS operations and associated mining would cease no later than December 22, 2019. Post-operation retirement activities for both the NGS facilities and mine would be similar to those described under the No Action alternative except they would begin 2 years later, and NGS retirement would take 5 years to complete (December 2024). Additionally, the STS and WTS would continue to be operated for an additional 35 to 70 years, and then those portions on Navajo Tribal Trust Lands

Resource	No Action	Proposed Action
	importance to Zuni identity….” (Panteah 2017). Under the No Action alternative, the leased Navajo Tribal Trust Lands for NGS operations would be returned to the Nation upon completion of retirement activities by the end of December 2020 or as described in the Retirement Actions, Section 2.4.1.1. A separate agreement would be needed to provide access to conduct long-term monitoring and remediation for an additional 30 years, as required by the CCR regulations. Mine reclamation and restoration would continue for approximately 15 years. If no agreement between the NGS Lessees and Navajo Nation is negotiated, the structures associated with the STS and WTS within Navajo Tribal Trust Lands would be removed and the land restored and returned to the Nation by the end of December 2019. **CAP – Central and Southern Arizona Counties and Tribes.** NGS retirement would necessitate actions on the part of CAWCD to secure dependable alternative sources of 2.7 terawatt hours of electrical power and energy to operate the CAP system. Options may include natural gas energy or renewable energy sources. The cost of NGS energy exceeds the current energy market prices. Using energy from sources other than the NGS would translate to reduced costs to CAP water users. Savings from purchasing energy on the market would outweigh the additional costs to CAP water users for debt obligation and for development of the CAP-affected Tribes’ water resources. Savings would amount to $9.6 million savings for CAP-affected Tribes, $7.5 million savings for agricultural recipients, and $9.3 million savings for M&I recipients. This scenario assumes that CAP M&I recipients would absorb the costs for repayment from loss of surplus energy sales. Surplus energy sales and revenues supporting the Development Fund would cease when the NGS retires. CAWCD would be required to compensate for the loss of Development Fund revenues to fund the CAP debt obligations. Other resources available include the capital charges assessed to M&I customers, reserves, ad valorem/property taxes, or adjustments in other budgeted expenditures. The loss of surplus revenue sales could increase pumping energy rates on the order of $10 to $15/AFA for M&I users, but this would be offset by reduction in the cost of energy needed for pumping. NGS retirement would result in a reduction of the cost for CAP water by between $12 and	would be retired. Under either alternative, the majority of the tribal trust lands upon which the NGS and the KM are located would be returned to their respective tribes after retirement, mine reclamation, and restoration have been completed. These facilities and structures have been present in the human environment for about the past 50 years. Impacts described by the Zuni, from the presence of these facilities and structures over the last half century, either would cease due to retirement or removal, or would continue for the foreseeable future for facilities and structures that remain. There would be no new impacts from ongoing operation and maintenance of the transmission systems. **CAP – Central and Southern Arizona Counties and Tribes**. Under the Proposed Action, the CAP would continue to purchase energy from NGS at above-market cost for 2 years, resulting in up to $27/AFA more in cost to CAP recipients, including the 10 CAP-affected Tribes. The CAP-affected Tribes, which are considered environmental justice populations, would not experience a disproportionate adverse effect when compared to the larger CAP delivery area. As with the No Action alternative, surplus energy from the NGS would no longer be available to support the Development Fund. The revenue needed to pay the CAP’s debt obligation would be paid from other sources, including increased capital charges by M&I recipients. Water that the CAP-affected Tribes lease to M&I users would be subject to increased O&M costs, but these would be paid by the water lessees and would not likely depreciate the value of the CAP-affected Tribes’ water to be leased to non-tribal entities. The costs for water used by the CAP-affected Tribes for agriculture would be higher for 2 years. This would result in a short-term adverse effect when compared to the No Action alternative, but would not be disproportionate compared to CAP recipients at large. After 2019, impacts to CAP water users, including the CAP-affected Tribes, would be the same as under the No Action alternative.

Resource	No Action	Proposed Action
	$27/AFA. Under the No Action alternative, the variable energy rates for delivery of CAP water would be lower, resulting in reduced drawdown of the Cooperative Fund, which would benefit the Tohono O'odham Nation. The No Action alternative would result in long-term beneficial effects on CAP recipients, including the 10 CAP-affected Tribes, as there would be a net reduction in the cost of energy to run CAP pumps beginning as soon as 2017. This would result in a lower draw on the Cooperative Fund. This benefit depends on the costs of energy staying low and the terms of any agreements CAWCD enters into with energy providers. The overall effect of the No Action alternative on the CAP-affected Tribes, which are considered environmental justice populations, would be beneficial, as the energy cost savings would outweigh the loss of revenues from the Development Fund that would support the Cooperative Fund and development of tribal water resources; and would result in reducing the depletion of interest income from the Cooperative Fund. There would be no disproportionate adverse environmental justice effect on the CAP-affected Tribes as a result of the No Action alternative.	
Indian Trust Assets	**Land**. Nation land trust assets within the study area that would be impacted under the No Action alternative include the lands covered by the Existing Lease to operate the NGS. Upon completion of retirement, lands would be restored as closely as possible to original condition where the surface of any leased land has been modified or disturbed, as required by the Existing Lease. Many of these Navajo Tribal Trust Lands have already been modified from the construction and operation of the NGS; minor short-term impacts would continue due to retirement activities until the end of 2020 at the latest. The extent to which traditional land use, such as hunting, gathering plants, and grazing, would be allowed by the Nation following retirement and restoration is uncertain. The lease payments to the Nation under the Existing Lease would cease in December 2018, which may be partially offset by revenues from granting access for remediation and monitoring. KM operations would cease at about the same time as the NGS ceases operations. PWCC would restore the land with equal or	**Land**. Nation land trust assets within the study area that would be impacted under the Proposed Action include about 3,507 acres under the Extension Lease. Upon completion of retirement, lands would be restored as closely as possible to original condition where the surface of any leased land has been modified or improved, as required by the Retirement Plan under the Extension Lease. These Navajo Tribal Trust Lands have already been modified from the construction and operation of the NGS; short-term impacts would continue due to retirement activities until the end of 2024 at the latest. About 644 acres of ash (CCR) disposal and solid waste landfills and wastewater ponds would be capped in place and subject to reclamation and remediation. These capped landfills and ponds would be permanent features of the NGS landscape after reclamation and would be subject to 30 years of remediation and long-term monitoring. Permanent Restrictive Covenants on about 644 acres would constitute a long-term adverse impact on Navajo Tribal Trust Land assets. NGS closure and retirement activities would not restore the land for residential and commercial land use without further remediation by the Nation. It is unclear whether traditional land use, such as hunting, gathering plants, and grazing, would be allowed in areas not covered by the Restrictive Covenants. KM mining operations would cease at about the same time as the NGS ceases operations

Resource	No Action	Proposed Action
	greater forage productivity than pre-mining conditions or for other approved uses including wildlife habitat and cultural plants. After reclamation is determined satisfactory by OSMRE and BIA, and following the release of bonds, control of the surface use would revert to the Nation and the Hopi Tribe for traditional land uses or other leasing opportunities such as wind and solar energy. If the STS and WTS continue to operate across Navajo Tribal Trust Lands under a separate agreement, this would contribute to the Nation's economy from continued lease payments and the potential to use the lands for renewable energy development. If an agreement cannot be reached, the portions of the STS and WTS on Navajo Tribal Trust Lands would be removed by 2020, releasing approximately 3,960 acres for other uses. It is assumed that grazing and other traditional land uses would be allowed after the transmission lines were retired and the lands restored, which would be a benefit. The Nation would cease to receive lease payments if the transmission systems were retired. If operation continues, the impacts would be the same as under the Proposed Action. **Water.** Pumping of Colorado River water from Lake Powell for NGS operations would be reduced to about 1,500 AFA to meet retirement water needs. The Nation has indicated it will claim Colorado River surface water as part of any future proceedings. Discontinued groundwater pumping for mine purposes at the KM would result in partial recovery of the N-Aquifer beneath the KM over time, but would also result in the loss of revenues to the Nation and the Hopi for N-Aquifer water use. CAP-affected Tribes would have lower costs for delivery of CAP water assuming natural gas prices remain low. There would be an indirect benefit of about $27/AF beginning in 2018. **Grazing, Hunting, and Gathering of Natural Resources.** At the NGS, it is anticipated that the Nation would permanently restrict traditional land use on about 644 acres over the capped landfills and ponds. It is unclear whether traditional land use would be restored in other areas of the NGS reclaimed lands without further remediation. No further lands would be mined at the KM, and reclaimed lands would eventually become available again for livestock grazing,	near the end of 2019. PWCC would restore the land to equal or greater forage productivity than pre-mining conditions or for other approved uses including wildlife habitat and cultural plants. After reclamation is determined satisfactory by OSMRE and BIA, and following the release of bonds, control of the surface use would revert to the Nation and the Hopi Tribe for other leasing opportunities such as wind and solar energy or traditional land uses. Monitoring of the final areas of reclaimed land is expected to take at least 10 years before bond release. Under the Proposed Action, the STS and WTS would continue to operate and be maintained for the 35-year Extension Lease followed by an option for a 2-year extension for decommissioning or a 35-year extension for continued operation and decommissioning. The additional lease payments for about 3,960 acres would contribute to the Nation's economy. The Nation would receive 500 MW of combined use and capacity from the STS and WTS from Reclamation; the first 10 years of O&M costs would be paid by the Lessees, after which the Nation would assume responsibility for all O&M and non-O&M costs annually for each year of the Extension Lease. The availability of transmission capacity would provide opportunities for renewable energy development along the transmission corridors on Navajo Tribal Trust Lands and provide long-term beneficial economic effects. When the STS and WTS are retired, the effects under the Proposed Action would be the same as under the No Action alternative. The loss of lease and other payments by SRP for the NGS, and loss of coal royalty payments to the Nation and Hopi Tribe for the KM, would result in the loss of tens of millions of dollars of annual income. In comparison to the No Action alternative, the Proposed Action would continue lease and coal royalty payments for 2 years, providing a short-term beneficial economic effect. **Water**. Effects on tribal trust water assets would be similar to the effects under the No Action alternative, except that water would continue to be drawn from Lake Powell for the NGS and pumped from the N-Aquifer for the KM for an additional 2 years. Upon NGS retirement and the cessation of mining at the KM, water use from Lake Powell and from the N-Aquifer would be substantially reduced to meet retirement and reclamation needs. Reduced water consumption at the KM would provide a long-term beneficial effect to the tribal trust assets from N-Aquifer recovery, but would also constitute a long-term adverse economic effect from the loss of revenue. Similar to the No Action alternative, the use of the N-Aquifer wells would revert back to the tribe where the well is located. The water used at NGS would remain as part of Arizona's allocation of the Upper Basin water subject to any of the Nation's water rights claims. Under the Proposed Action, CAP-affected Tribes would continue to pay about $27/AF more for NGS energy to pump water for 2 years, assuming natural gas prices remain low. After NGS closure, the effects from the Proposed Action would be the same as those under the No Action alternative.

Resource	No Action	Proposed Action
	hunting, and gathering of plants and other natural resources, which would constitute a long-term beneficial effect on traditional land use. Regardless of whether the STS and WTS continue to be operated and maintained or are retired by 2020, hunting and gathering, grazing, and other traditional land uses would continue in the ROW. However, more land would be available for traditional or other land uses once the transmission systems have been removed and the land restored. **Minerals**. Discontinued mining at the KM would constitute a long-term adverse economic effect from the loss of coal royalty payments. Coal royalty payments in the tens of millions would be lost 2 years early.	**Grazing, Hunting, and Gathering of Natural Resources.** The effects on traditional land use under the Proposed Action are much the same as those under the No Action alternative, except that the return of restored and reclaimed lands would be delayed for 2 years at the NGS and the KM and for 35 years or more along the STS and WTS. To the extent that grazing and other traditional land uses are allowed after NGS retirement and KM reclamation, the Proposed Action would have a short-term adverse effect on traditional land use but a long-term beneficial effect after reclamation and remediation are completed. **Minerals.** The effect on minerals under the Proposed Action is the same as the effect under the No Action alternative, except that coal royalty payments would continue for 2 years. The Proposed Action would have a short-term beneficial economic effect from Nation and Hopi Tribe mineral assets in comparison to the No Action alternative, but it would also constitute a long-term adverse economic effect from the permanent loss of coal royalty payments following the cessation of mining.

Chapter 3. Affected Environment and Environmental Consequences

3.1 Introduction

As required by the Council of Environmental Quality (CEQ) regulations (40 CFR Parts 1508.7 and 1508.8), this chapter describes the affected environment or existing setting (referred to as the "analysis area," which varies by resource and analyzes the potential environmental consequences (impacts or effects) that would occur as a result of implementing the No Action and Proposed Action alternatives. Impacts can be direct, indirect, or cumulative. Direct impacts are caused by an action and occur at the same time and place as the action. Indirect impacts are caused by the action and occur later in time or farther away in distance, but are still reasonably foreseeable. Effects (impacts) may have both beneficial and detrimental effects. The environmental consequences of the No Action alternative are described for each of the resources to provide a baseline for the analysis of the Proposed Action.

The three major project components covered under the Proposed Action and analyzed in this section include the NGS and associated facilities;[23] the KM, including the mine, coal conveyor, and coal loadout facility; and the STS and WTS on Navajo Tribal Trust Lands, including the transmission systems, switchyards, and communication sites.

3.1.1 Relationship to KM EA

All NEPA and other environmental compliance for the KM has been completed for past, current, and future (through 2020) mining and reclamation actions. In addition to an EIS completed in 1990 (OSMRE), the KM has undergone a permit renewal process, which includes NEPA findings, every 5 years to continue to operate under its existing SMCRA LOM permanent permit (see Section 1.1.4). OSMRE most recently issued an EA covering operations for 2015–2020 (KM EA, OSMRE 2017). OSMRE's EA includes an analysis of the indirect effects of the use of the coal from the KM, i.e., the combustion of the coal at NGS. For convenience, the KM EA can be accessed at: https://www.wrcc.osmre.gov/initiatives/kayentaMine/2015Renewal/Kayenta_Mine_EA.pdf.

The KM EA evaluated two alternatives:

3.1.1.1 Alternative 1: Approve Renewal of Permit AZ-0001E

Under this alternative, OSMRE would approve the renewal of permit AZ-0001E for continued mining in Coal Resource Areas (CRAs) N-9, J-19, and J-21 and associated reclamation activities in accordance with the KM's current approved mining and reclamation plans (KM EA, Appendix B), as well as the continued use of current and proposed facilities necessary for mining and reclamation operations[24] for not more than 5 years (July 6, 2015, to July 5, 2020).

[23] The NGS and associated facilities include an 80-mile railroad and coal handling facilities at the railroad terminus and at the plant; a water supply system from Lake Powell; coal-fired boilers; steam turbine generators; water treatment; air pollution control systems; waste management facilities; transformers, switchyards, transmission lines, and substations; roads; communication sites; and administration, operation, maintenance, and warehouse facilities.
[24] "The only new mine facilities that are proposed to be constructed as part of the mining and reclamation under the Renewal would be previously approved sediment ponds, roads, utilities, and topsoil stockpiles. Mine reclamation and collection of topsoil from 6 acres would also occur on CRA N-11" (OSMRE 2017).

3.1.1.2 Alternative 2: Disapprove Renewal of Permit AZ-0001E

Under this alternative, for the purposes of the KM EA analysis, ongoing mining operations at the KM are assumed to have occurred between July 6, 2015, and April 30, 2017, because impacts would occur during this period due to OSMRE's Administrative Delay in Decision. Under Alternative 2, OSMRE would not renew permit AZ-0001E, and mining would cease on April 30, 2017. Facility removal and reclamation activities would proceed within the three CRAs being currently mined, plus N-11 and other disturbed areas within the Permit Area according to the provisions in the current approved reclamation plan, PAP, and SMCRA regulations. Mine reclamation activities would continue throughout the KM until December 2017 or until all reclamation obligations are met.

The KM EA alternatives are parallel to the Proposed Action and No Action alternatives in this EA, although the timing varies somewhat (see Sections 2.3.2.2, 2.3.3.2, and 2.4.2). The analysis areas, affected environment, and environmental consequences (including cumulative effects) in this EA rely on the information in the KM EA, including its assumptions, for purposes of evaluating the indirect impacts from mining activities (see 43 CFR Part 46.120).

3.2 Background for Cumulative Effects

Potential effects of the Proposed Action could occur in the context of other actions that are likely to occur in the analysis area. Cumulative impacts are the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over time. These impacts are analyzed regardless of who undertakes the actions (40 CFR Part 1508.7) and are analyzed for each resource topic carried forward.

3.2.1 Past, Present, and Reasonably Foreseeable Future Actions

Past and present actions are actions that have occurred or are ongoing in the analysis area. "Reasonably foreseeable future actions" are defined as actions that are not speculative—they have been approved, are included in planning and budget documents prepared by the individual(s), or are likely to occur given trends (Environmental Protection Agency [EPA] 1999).

Past, present, and reasonably foreseeable future actions were identified through public and agency scoping and available information on known projects under consideration. Actions that meet all of the following criteria are considered reasonably foreseeable and are included in the cumulative impacts analysis:

- The potential impacts of the future action would occur within the same geographic area (analysis area) and during the same time as the potential impacts of the Proposed Action.
- The future action may affect the same environmental resources as the Proposed Action.
- There is a reasonable expectation the future action would occur; the future action is not speculative.
- There is sufficient information available to define the future action and assess potential cumulative impacts (EPA 1999; CEQ 1997).

The following is a summary of past and present actions with the potential to contribute to cumulative impacts.

3.2.1.1 Past and Current NGS Operations

Past and current NGS operations include combustion of coal supplied by the KM, employing 553 full- and part-time employees (90 percent of whom are Navajo or Hopi). In addition to providing employment, the NGS provides a substantial source of revenue to the Hopi Tribe and Nation through coal royalty payments, scholarships, and other contributions.; the Nation also receives permit fees and lease payments. Since 1969, NGS operations have resulted in regional deposition from NGS emissions; land use restrictions; water use and management; solid waste, ash (CCR) and other hazardous materials disposal; and other ground disturbances within Navajo Tribal Trust Lands.

3.2.1.2 Past and Current Coal Mining Operations

Previous and current operations at the KM include coal mining, regrading, and reclamation. As of December 31, 2015, approximately 19,330 acres have been disturbed at the KM; of that, approximately 14,546 acres have been reclaimed (note that NEPA compliance for all past, current, and future mining [through 2020] and reclamation actions for the KM has been completed; see Section 1.1.4).

3.2.1.3 Past Groundwater Pumping by PWCC

During the period of 2009–2013, total groundwater pumping from the N-Aquifer on and near Black Mesa averaged 4,190 acre-feet annually (AFA)— consisting of 1,330 AFA (one-third) by PWCC and 2,860 AFA (two-thirds) by tribal municipal systems (Macy and Truini 2016).

3.2.1.4 San Juan Projects and Water Uses

The San Juan River Ecological Study (EPRI 2016) suggested potential impacts on water quality and aquatic resources in the San Juan River Basin resulting from future NGS emissions. The upper San Juan River watershed encompasses a large area of southwestern Colorado. The river flows from Colorado into northwestern New Mexico and then across southern Utah to its confluence with Lake Powell. The primary San Juan River surface water storage is Navajo Reservoir east of Farmington, New Mexico, which is used as a regulator for a variety of diversions and releases for downstream users and instream resources, such as listed native fish species. A variety of municipal, agricultural, and industrial diversions are located above and below Navajo Reservoir. Relevant past, present, and reasonably foreseeable projects and events are described below.

3.2.1.4.1 Four Corners Power Plant Operations and Water Use

Four Corners Power Plant Operations

The Four Corners Power Plant is a coal-fired power station owned and operated by Arizona Public Service Company (APS) and is on Navajo Tribal Trust Lands near Fruitland, New Mexico. The station consists of five units, the three oldest of which were retired in 2013. The plant's two active units generate 1500 megawatts (MW) of electricity and are operated by APS, which serves about 300,000 homes in New Mexico and Arizona. The coal supply for the Four Corners Power Plant is provided by the Navajo Mine located adjacent to the plant, which is owned by the Navajo Transitional Energy Company, a Navajo Nation business enterprise.

Four Corners Power Plant Water Use

The Four Corners Power Plant diverts water from the San Juan River into Morgan Lake, a storage reservoir. As a result of a Best Available Retrofit Technology agreement with EPA, the Four Corners Power Plant shut down three of five units in 2013, with an approximately 60 percent reduction in cooling water needs. On July 14, 2015, OSMRE issued a Record of Decision (ROD) (OSMRE 2015) that approved surface coal mining in existing and new Navajo Mine permit areas, a lease amendment for the Four Corners Power Plant, and various ROWs for transmission lines and roads. The project Biological Opinion (U.S. Fish and Wildlife Service [USFWS] 2015a) was attached to the ROD. The Biological Opinion contains conservation measures designed to offset project impacts on threatened and endangered species, primarily the Colorado pikeminnow and the razorback sucker. The major areas addressed in the conservation measures are reduction of larval fish impingement and entrainment at the power plant diversion structure; nonnative fish control measures; construction of fish passage structures; monitoring for effects of selenium and mercury in listed fish; fish habitat improvement within the San Juan River channel; support for the San Juan River Basin Recovery Implementation Program; water temperature effects study on Colorado pikeminnow; and implementation of surveys for southwestern willow flycatcher, western yellow-billed cuckoo, and endangered plant species.

3.2.1.4.2 San Juan Generating Station Operations and Water Use

San Juan Generating Station Operations

The San Juan Generating Station is a 1,800-MW coal-fired power plant that is owned and operated by Public Service Company of New Mexico (PNM). In 2013, PNM filed for approval to decommission two of the San Juan Generating Station's coal-burning stacks by 2017 (units 2 and 3) and install nitrogen-oxide emission reducing technology on the remaining two completed in 2016 (units 1 and 4).

http://www.sourcewatch.org/index.php/San_Juan_Generating_Station - cite_note-ds-1 PNM plans to build a natural gas peaking station in San Juan County to generate 177 MW during high-demand periods, and a 40-MW solar generation station.

San Juan Generating Station Water Use

Current PNM diversions from the San Juan River are approximately 16,200 AFA (USFWS 2009). The shutdown of units 2 and 3 would reduce water consumption by approximately 50 percent or 8,100 acre-feet (PNM 2017). The coal supply for the San Juan Generating Station is provided by the San Juan Mine located adjacent to the plant.

For aquatic biology and special status species, there is a cumulative impacts overlap between NGS trace metal deposition impacts on the Colorado pikeminnow and the razorback sucker in the San Juan River watershed, and trace metal deposition from both the Four Corners Power Plant and San Juan Generating Station projects in northwestern New Mexico. Both projects divert from the San Juan River, which in turn affects the quantity and quality of riverine habitat downstream of the New Mexico/Utah border. The ESA consultations and Biological Opinions for these projects provide background for ongoing ESA consultations for the NGS EA.

3.2.1.4.3 Navajo-Gallup Water Supply Project

This project authorized in Public Law 111-11 (2009) as part of the Nation's water rights settlement with the State of New Mexico and is under construction with completion scheduled by 2024. The purpose of this project is to provide new sources of water to a variety of Nation communities including Gallup, New Mexico. The project was analyzed in an EIS (U.S. Bureau of Reclamation [Reclamation] 2009), and a Biological Opinion (USFWS 2009) was prepared that addressed project effects on the listed fish habitat in the river. The project would divert approximately 38,000 acre-feet per year from the San Juan River, resulting in an annual depletion of approximately 36,000 acre-feet. Depletions for this project have been approved by the U.S. Fish and Wildlife Service as part of its compliance under Section 4 of the Endangered Species Act. San Juan River flows required for the recovery of endangered fish would be protected and maintained under a Depletion Guarantee, approved by the Nation (USFWS 2009). Navajo Dam would continue to be operated to maintain the recommended river flow pattern specified in the San Juan River Basin Recovery Implementation Program.

3.2.1.4.4 Hogback-Cudei and Fruitland Canal Rehabilitation Projects

These irrigation projects located between Farmington and Shiprock, New Mexico, were constructed for the benefit of the Nation in the early 1900s. Public Law 111-11 authorizes the rehabilitation of the canals for these projects in order to reduce seepage losses and improve water delivery efficiency to the irrigated lands. The environmental compliance for these projects is being conducted by BIA.

3.2.1.4.5 Gold King Mine Water Release into the Animas River

On August 5, 2015, approximately 3 million gallons of acid mine drainage water were accidentally discharged from the Gold King Mine into the upper Animas River drainage in Colorado. The Animas River is a major tributary of the San Juan River. Water quality and sediment monitoring programs were immediately initiated by state and federal agencies at intervals along the Animas and San Juan Rivers. The Utah Department of Water Quality (UDWQ) conducted water quality sampling at five San Juan River locations from Montezuma Creek to Mexican Hat from August 2015 through October 2015 (UDWQ 2016a). Sample results were compared with human health and aquatic life screening levels over multiple sampling periods. Post-release plume metal concentrations in river sediments were both higher and lower than pre-release concentrations at some sampling sites; however, all 2015 sample concentrations were within the historical range of metals concentrations measured in the San Juan system. Additional UDWQ water sampling was conducted in February, March, April, and June 2016 (UDWQ 2016b). The results of this sampling were screened against recreational, drinking water, agricultural, and aquatic life criteria.

With the exception of aluminum criteria for aquatic life and total dissolved solids for agriculture, no exceedances of criteria were identified. Monitoring of water quality and sediments will continue to determine the potential for long-term trace metal effects on ecological and human health. In March 2016, EPA issued a conceptual monitoring plan (EPA 2016) that addressed Animas and San Juan River water, sediment, macroinvertebrate, and fish sampling scheduled for 2016. The plan included San Juan River sites previously sampled by UDWQ in 2015. Monitoring of the sites included in the EPA plan may continue after 2016.

3.2.1.5 Glen Canyon Long-Term Experimental and Management Plan

The U.S. Department of the Interior, through Reclamation and NPS, is implementing a Long-Term Experimental and Management Plan (LTEMP) for operations of Glen Canyon Dam. The LTEMP will provide a framework for adaptively managing Glen Canyon Dam operations over the next 20 years with the goal of creating certainty and predictability for power and water users while protecting environmental and cultural resources in Grand Canyon National Park and the Colorado River Ecosystem.

The LTEMP ROD and EIS (Reclamation and NPS 2016) evaluate the effects of different reservoir release alternatives on resources including sediment resources, aquatic and terrestrial ecological resources, historic and cultural resources, resources of importance to Native American tribes, recreational resources, and designated wilderness in the vicinity of Glen Canyon and the Grand Canyon; as well as socioeconomic resources, hydropower resources, and air quality.

For the aquatic biology and special status species cumulative impact analysis, estimated future instream habitat conditions (i.e., water volume, water chemistry, and temperature) resulting from implementation of the LTEMP alternatives were considered in the context of trace metal deposition from the NGS stacks and consequential ecological risks (Ramboll Environ 2016a). The LTEMP incorporates a number of measures to increase the likelihood of humpback chub (*Gila cypha*) endangered fish recovery and reduction in nonnative fish invasion.

3.2.1.6 Groundwater Use – Community Well Fields

BIA, the Navajo Tribal Utility Authority (NTUA), and the Hopi Tribe operate about 70 N-Aquifer wells that are combined into 28 water supply systems that provide water to communities near Black Mesa. The closest communities to the PWCC wells are Forest Lake, Kitsillie, Chilchinbito, and Kayenta. The largest water users are Tuba City, Kayenta, and Shonto (Truini et al. 2005).

Community pumping would continue to increase during the period from 2015 to 2032 and beyond due to increased demand for water. The projected conservative increase in demand is around 2.7 percent per year (OSMRE 2011b). Community water use in 2008 was around 2,900 AFA. Projected water use by 2025 at a growth rate of 2.7 percent per year is around 4,500 AFA; by year 2038, community water use would be around 5,400 AFA.

3.2.1.7 Manymules Water Project

Using two PWCC existing water wells and a portion of a PWCC water line, the Manymules project when completed would convey a high-quality sustainable water supply to approximately 60 residences within the Permit Area using funds from Indian Health Service and other entities (Black Mesa Review Board [BMRB] 2015; Nation 2011; Nation 2013). BMRB was awarded an Abandoned Mine Land program grant to construct bathroom additions and install plumbing in homes to be served by the Manymules Water Project (BMRB 2010). This is Phase 1 of a four-phase project to provide potable water to residents in the KM Permit Area. The project includes 46 miles of water pipeline, two water treatment units, pump stations, and water storage. The total 2030 water demand projected for the Manymules project is about

252 AFA. Based on conceptual level designs, the Navajo Nation Department of Water Resources estimates the entire project cost is approximately $21 million dollars.

3.2.1.8 Hopi Arsenic Mitigation Project

The Hopi Arsenic Mitigation Project is being developed to pump water from the Turquoise wellfield located approximately 15 miles north of Second Mesa and pipe it to the Hopi villages at First and Second Mesas, to the Keams Canyon Water System, and the water systems for Hopi Junior-Senior High School and Second Mesa Day School to provide water that complies with the Safe Drinking Water Act for arsenic. The project is in the early stages of funding and would replace the use of low-producing, high arsenic wells in the vicinity of First and Second Mesa and Keams Canyon. In contrast, the Turquoise wellfield would access an area of the N-aquifer where arsenic concentrations are below standards and well production would be high.

3.2.1.9 LeChee Electrification Project

Many residences on the Nation and Hopi Reservation do not have electrical power to their homes. The LeChee Electrification Project resulted in 63 residences within the LeChee Chapter receiving power (Native News Online 2014). Completed in 2015, the project was funded by the NGS Lessees, NTUA, the Navajo Nation Abandoned Mine Lands Program, the U.S. Department of Housing and Urban Development, and grants obtained by LeChee Chapter (Morrison 2014). Power is supplied by NTUA.

3.2.1.10 Former Bennett Freeze Area (Navajo) Proposed Integrated Resource Management Plan

The proposed federal action is the approval of an Integrated Resource Management Plan (IRMP) for the Former Bennett Freeze Area (FBFA) (1.6 million acres) as prepared by the BIA Navajo Region and Nation. The IRMP and the associated NEPA documentation specifically address implementation of capital projects in the FBFA, including the use of federal funds. The IRMP is a strategic, vision-based, long-range management plan based on Nation members' interests, needs, and concerns for their lands and for natural and cultural resources. The purpose of the IRMP is to meet the social, cultural, economic, and long-term sustainability needs of the residents of the FBFA. The IRMP is a guide for decision-making by the Nation and BIA to manage existing Nation resources and to plan for integrated development.

3.2.1.11 Land Management District 3 Range Management Plan

Western Agency, BIA Navajo Region, in conjunction with the Nation, is developing an EA to analyze the impacts from a proposed Range Management Plan (RMP). When completed, the Land Management District (LMD) 3 RMP will serve as a Nation policy document based on the Nation's vision for the redevelopment of the LMD 3. The BIA is required by 25 CFR Part 167 and the Navajo Nation Code Title 3 Agriculture, the Navajo Grazing Regulation of December 24, 1957, § 167.3 (a), (b), (e), "to adjust livestock numbers to the carrying capacity of the range…that the livestock economy of the Navajo Tribe will be preserved."

3.2.2 Potential Future Actions of the Nation

It is anticipated the Nation will use the retained buildings and BM&LP Railroad in the future to support new development and seek use of Colorado River water from the Lake Powell intake structure. These potential future actions, however, do not meet the criteria identified in Section 3.2.1 and are too speculative to be considered in this EA.

3.3 Air Quality

This section describes the affected environment and environmental consequences for air quality in the analysis areas potentially affected by various components of the proposed Extension Lease. The analysis areas are presented first, followed by a description of the affected environment. This section concludes with environmental consequences describing the direct and indirect effects of the No Action and Proposed Action alternatives followed by cumulative effects. As summarized in Section 3.1.1, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.3.1 Regulatory Framework

3.3.1.1 Ambient Air Quality Standards

The Clean Air Act (CAA) requires establishment of National Ambient Air Quality Standards (NAAQS) for seven criteria air pollutants across the U.S., including primary standards to protect the health of the citizens and secondary standards to protect other welfare-related values (Table 3). The CAA requires existing and proposed emission sources to demonstrate compliance with those standards. While some states adopt air quality standards that are more stringent than the NAAQS, the NGS and the KM are subject to federal statutes and regulations.

The NAAQS were established to provide ample protection of air quality, even for receptors that may be particularly sensitive to air quality conditions such as children, the elderly, and acutely or chronically ill persons with respiratory diseases. Sensitive receptor locations can include schools, day care facilities, hospitals, senior citizen centers, and recreational areas that are frequented by youth.

Table 3. National Ambient Air Quality Standards.

Pollutant	Standard	Averaging Period	Concentration		Statistical Format
			ppb	µg/m^3	
Ozone (O_3)	Primary & Secondary	8-hr	70	137	3-year average of the annual fourth-highest daily 8-hour concentrations
Nitrogen Dioxide (NO_2)	Primary	1-hr	100	188	3-year average of the annual 98th percentile highest daily 1-hour concentrations
	Primary & Secondary	Annual	53	100	Annual mean
Sulfur Dioxide (SO_2)	Primary	1-hr	75	196	3-year average of the annual 99th percentile highest daily 1-hour concentrations
	Secondary	3-hr	500	1,300	Not to be exceeded more than once per year
Carbon Monoxide (CO)	Primary	1-hr	35,000	40,000	Not to be exceeded more than once per year
	Primary	8-hr	9,000	10,000	
Particulate matter ≤ 10 µm diameter (PM_{10})	Primary & Secondary	24-hr	N/A	150	Not to be exceeded more than once per year on average over 3 years
Particulate matter ≤ 2.5 µm diameter ($PM_{2.5}$)	Primary	Annual	N/A	12	Annual mean, averaged over 3 years
	Secondary	Annual	N/A	15	Annual mean, averaged over 3 years
	Primary & Secondary	24-hr	N/A	35	3-year average of the annual 98th percentile highest daily average concentrations
Lead (Pb)	Primary & Secondary	3-month rolling	N/A	0.15	Not to be exceeded

ppb: parts per billion by volume
µg/m^3: micrograms per cubic meter; standard conditions
Source: 40 CFR Part 50 NAAQS Table https://www.epa.gov/criteria-air-pollutants/naaqs-table.

In ongoing review and regulatory actions, EPA and the state and tribal governments designate areas as:

- "Attainment" or "better than NAAQS" if monitored data demonstrate compliance with the standards; or

- "Unclassifiable" or "cannot be classified" if monitored data are not available for such determinations; or
- "Non-attainment" for either primary or secondary standards if monitored values of the criteria air pollutants are above the NAAQS; or
- "Maintenance" if in the process of re-designating to attainment by continuing to show compliance with the NAAQS after having initially been in non-attainment.

Non-attainment areas for ozone also may be subclassified from "marginal" to "extreme," and non-attainment areas for particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) and particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$) may be subclassified as "moderate" or "serious" depending on the air quality levels. Both the direct effects analysis areas and the indirect effects analysis area are designated as in "attainment" or "unclassified" for all criteria air pollutants and are thereby in compliance with the NAAQS. In the 300-km analysis area around the NGS and the KM (see Section 3.3.2), all areas are designated as attainment or unclassified; therefore, the area is in compliance with the NAAQS.

3.3.1.2 Hazardous Air Pollutants

Hazardous air pollutants (HAPs), or air toxics, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects, birth defects, or adverse environmental and ecological effects. Title III of the CAA Amendments of 1990 currently identifies 187 pollutants as HAPs. In 2001, EPA identified 21 HAPs as mobile source air toxics, six of which are designated priority pollutants (66 CFR Part 17235). Diesel particulate matter (DPM) is considered a carcinogenic air toxic. An EPA assessment (EPA 2002) examined the possible health hazards associated with exposure to DPM in diesel engine exhaust, which is a mixture of gases and particles. The assessment concluded that long-term (i.e., chronic) inhalation exposure is likely to pose a lung cancer hazard to humans, as well as damage the lung in other ways depending on exposure. Short-term (i.e., acute) exposures can cause irritation and inflammatory symptoms of a transient nature (EPA 2002). However, no EPA standard exists for DPM.

In addition to DPM from mining equipment and heavy trucks, coal combustion in power plant boilers emits a wide range of inorganic and organic HAPs from stacks (40 CFR Part 63 Subpart UUUUU). Coal-fired power plants are the largest source of mercury and acid gas emissions in the U.S.; they are responsible for about 50 percent of mercury emissions and about 77 percent of acid gas emissions (EPA 2011a). Most mercury deposited in the western U.S., however, originates in Asia (Strode et al. 2008). Peer-reviewed scientific literature shows that mercury emissions from electric generating units in the U.S. enhance mercury deposition and the response of ecosystems in the U.S. (77 FR 9339). Other toxic metals emitted from power plants include arsenic, chromium, hexavalent chromium, nickel, and selenium (EPA 2013a).

When divalent mercury from the air reaches surface waters via direct and indirect deposition, microorganisms can convert it into methylmercury, a highly toxic form that can bioaccumulate in fish. Humans are primarily exposed to mercury by eating contaminated fish. Methylmercury exposure is a particular concern for women of childbearing age, fetuses, and young children because studies have linked high levels of methylmercury to damage to the developing nervous system, which can impair children's ability to think and learn. Mercury and other power plant emissions also can damage the ecological environment when present at sufficient concentrations and durations (EPA 2013a).

On December 16, 2011, EPA issued the final Mercury and Air Toxics Standards (MATS) and Utility National Emission Standards for Hazardous Air Pollutants (NESHAP), which were published in the Federal Register on February 16, 2012 (77 FR 9304).

Promulgated as 40 CFR Part 63 Subpart UUUUU – National Emission Standards for Hazardous Air Pollutants for Coal- and Oil-Fired Electric Utility Steam Generating Units, the MATS establishes emission limitations and work practice standards for HAPs emitted from coal- and oil-fired electric utility steam generating units along with requirements to demonstrate initial and continuing compliance with the HAP emission limits.

As an existing coal-fired generating facility, the NGS must comply with specific HAP emissions limits for the following pollutants:

- Filterable PM, total non-mercury HAP metals, or individual HAP metals (antimony, arsenic, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, selenium);
- Hydrogen chloride or sulfur dioxide; and
- Mercury.

The NGS has implemented the monitoring, testing, recordkeeping, and reporting requirements and has performed the applicable work practice standards that are mandated to demonstrate compliance with the MATS.

3.3.1.3 Prevention of Significant Deterioration

The Prevention of Significant Deterioration (PSD) regulations (40 CFR Part 51.166 and 40 CFR Part 52.21) provide the overall air quality regulatory framework for the permitted operations of the NGS and the KM. The PSD program is designed to:

- Protect public health and welfare;
- Preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value;
- Ensure that economic growth will occur in a manner consistent with the preservation of existing clean air resources; and
- Ensure that any decision to permit increased air pollution in any area to which this section applies is made only after careful evaluation of all the consequences of such a decision and after adequate procedural opportunities for informed public participation in the decision-making process.

The PSD program does not prohibit new or existing stationary sources, such as oil refineries, factories, or power plants, from increasing emissions; rather, PSD is designed to ensure that emissions increases would have no significant effect on regional air quality (EPA 2013b).

EPA's PSD program defines when an emissions increase that results from certain types of changes at a stationary source is "significant" and thereby warrants investigation into the extent of the ambient air quality impact caused by that emissions increase. The NGS is not an increment consuming facility, and therefore, NGS impacts on ambient air quality in Class I areas were not evaluated for comparison to those Class I increments. The existing ambient air quality conditions at those locations already reflect the impacts from historic and ongoing operations at the NGS.

3.3.1.4 Regional Haze Rule

In the 1977 Amendments to the CAA, Congress added Section 169A to establish a national goal of the "prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution." In 1990 EPA promulgated regulations to address "reasonably attributable" visibility impairment in Class I national parks and

wilderness due to a single source or small group of sources. Reasonably attributable visibility impairment has been certified for six coal-fired electric generating facilities since 1986. In March 1986 the Department of the Interior certified that the NGS was causing visibility impairment in Grand Canyon National Park. After detailed analyses, public comment, and regulatory actions, emission controls to reduce sulfur dioxide were installed on the three NGS units between 1997 and 1999.

In the 1990 Amendments to the CAA, Congress added Section 169B to address regional haze, which is visibility impairment produced by multiple sources and activities across a broad geographic area. The Grand Canyon Visibility Transport Commission was created to recommend strategies to protect visual air quality at national parks and wilderness areas on the Colorado Plateau and made recommendations to EPA in 1996.

In 1999 EPA promulgated the Regional Haze Rule, which requires states or tribes to submit implementation plans every 10 years that demonstrate long-term emission reduction strategies to improve visibility in Class I national parks and wilderness areas. EPA implemented a federal plan for the NGS to meet Regional Haze Rule requirements to reduce visibility impacts of nitrogen dioxides (40 CFR Part 49.5513).

3.3.1.5 Title V Program

The CAA Amendments of 1990 introduced a new facility-wide Federal Operating Permit program. Federal Operating Permits, also known as Title V permits, are required for facilities with the potential to emit more than 100 tons per year of a regulated pollutant, 10 tons per year of any single HAP, or 25 tons per year of any combination of HAPs. These facilities are considered to be Title V major sources of air quality emissions. No NAAQS exist for HAPs; instead, emissions of these pollutants are regulated by a variety of laws that target the specific source class and industrial sectors for stationary, mobile, and product use/formulations. However, Title V permitting is still required if HAP emissions rise above the defined thresholds.

EPA has delegated the CAA's Title V operating permit program to the Navajo Nation Environmental Protection Agency (NNEPA). NNEPA issued the NGS an operating permit (NN-ROP 05-06) on July 3, 2008, and the KM an operating permit (NN-OP-08-010) on April 14, 2011. NGS and KM have both submitted timely permit renewal applications, which are in the process of being renewed with NNEPA.

3.3.2 Analysis Area and Methods

The air quality analysis area consists of several regions depending on the nature of the effects. The analysis area for Near-Field direct effects is the region within 50 kilometers (km) around the NGS, while the Regional Analysis Area surrounding NGS assessed the potential impacts of pollutants that could disperse to a broader area than the Near-Field area. The analysis area for indirect effects due to coal mining at the KM is the mine permit area plus a 50-km buffer zone around the perimeter of the mine.

Air quality impacts are assessed through a combination of dispersion modeling and analysis of monitoring data.

3.3.3 Affected Environment

3.3.3.1 Existing Air Quality

3.3.3.1.1 Major Regional Sources

There are several large sources of air pollutants in the Four Corners region. Appendix 3 provides a list of the major cumulative sources (i.e., with emission of any pollutant above 100 tons per year) in southern Utah, northern Arizona, and the northwestern corner of New Mexico (San Juan County) and the annual

emissions of these sources. Emissions impacts from other regional urban areas (Phoenix, Salt Lake City, Las Vegas, etc.) would be represented as background concentrations currently monitored at the regional air quality sites. The tabulated data are for 2011.

3.3.3.1.2 Regional Air Quality Monitoring

Regional ambient air quality near the NGS was examined through a review of the major regional sources of air pollution and ambient air concentration observations at EPA Air Quality System (AQS) monitoring stations near the NGS and at the Glen Canyon monitoring station operated by the NGS. Recent trends in regional ambient air quality for criteria pollutants are summarized, and the measured concentrations (in the form of the NAAQS for these pollutants) are compared with the corresponding NAAQS.

Ambient air concentration data are reviewed for the following seven criteria pollutants: SO_2, O_3, PM_{10}, $PM_{2.5}$, NO_2, CO, and Pb. The NAAQS values for these pollutants are shown in Table 3 for the primary (human health-based) standards; these are equivalent to or more stringent than the secondary standards.

A review of ambient air quality data for NO_2, SO_2, O_3, and PM was conducted at AQS monitoring stations in northern Arizona (Apache, Coconino, Mohave, and Navajo Counties), Southern Utah (Garfield, San Juan, and Washington Counties), northern San Juan County in New Mexico, and the Mesa Verde monitoring site in Montezuma County, Colorado, as well as the Glen Canyon monitor operated by the NGS. Additionally, for CO and Pb, the nearest available representative sites were used in this review. A site in southwestern Colorado, Ignacio, was used for CO, and the JLG supersite in central Phoenix was used for Pb. The ambient design values and concentrations at AQS monitoring locations are based on EPA's Design Value Reports (https://www.epa.gov/air-trends/air-quality-design-values) and air quality reports (https://www3.epa.gov/airquality/airdata/ad_rep_mon.html), respectively. Appendix 3 provides a list of the sites that were used in this review and the pollutants measured at these sites during the period of interest (2011 to 2014). Most sites monitor a limited subset of the species and also have invalid or insufficient data for some years. Figure 3 shows the locations of the monitoring sites used for this review of regional ambient air quality.

Regional monitored ambient air concentrations of NO_2, SO_2, O_3, $PM_{2.5}$, and PM_{10} are provided in Appendix 3. Also shown are design values (observations expressed in the form of the NAAQS) for each pollutant.

The monitored ambient air concentrations of NO_2 in the region are well below the 1-hour and annual NAAQS.

As in the case of 1-hour and annual NO_2, the measured 99th percentile 1-hour SO_2 values at all locations are well below the corresponding NAAQS. Note that SO_2 measurements at the Dine College GIS Lab monitoring site in Shiprock are all flagged in the EPA database as corresponding to exceptional events and are not considered.

For the period from 2011 to 2014, the NAAQS for 8-hour ozone was 0.075 ppm, and all monitors meet that standard. The current NAAQS for 8-hour ozone (promulgated in October 2015) is lower (0.070 ppm), and most monitors meet that standard.

The design values (3-year average of the 98th percentile value) for 24-hour $PM_{2.5}$ concentration for all sites meet the 35 $\mu g/m^3$ NAAQS. The 98th percentile value at the Glen Canyon monitoring site in 2013 is 43 $\mu g/m^3$ and is likely due to an exceptional event, because other monitored values at this site in other years are below the standard by 30 percent or more. Annual average $PM_{2.5}$ design values also meet the NAAQS concentration of 12 $\mu g/m^3$.

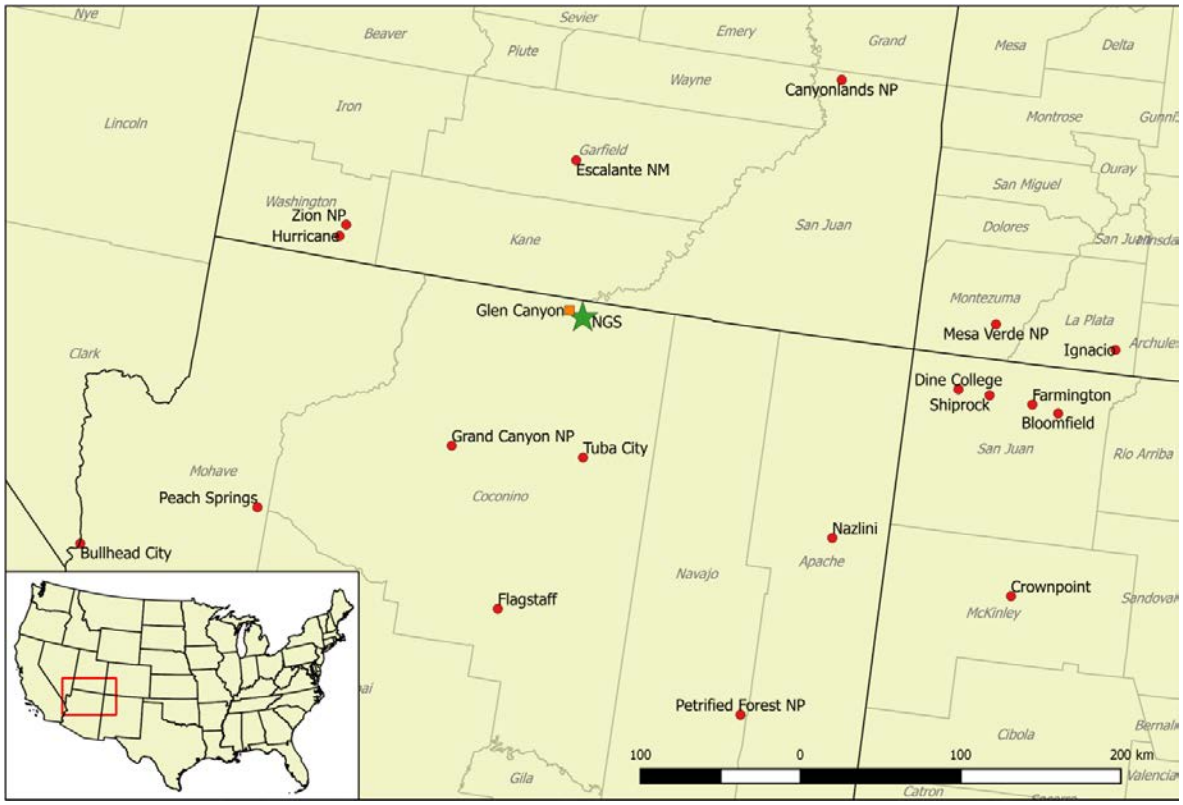

Figure 3. Locations of Monitoring Stations Used in the Review of Regional Air Quality.

At all locations reviewed, the measured second-highest 24-hour maximum PM_{10} concentration is much lower than the NAAQS of 150 µg/m^3, so there are no exceedances of the PM_{10} standard in the region.

At the Ignacio, Colorado, site, 1-hour CO concentrations vary from 0.8 to 1.7 ppm during 2011 to 2014, much lower than the NAAQS of 35 ppm. Similarly, 8-hour average CO concentrations vary from 0.6 to 1.0 ppm, while the standard is 9 ppm.

The rolling 3-month average of Pb concentrations at the central Phoenix site is 0.01 µg/m^3 during 2012 to 2014 (no Pb data are available for 2011). This value is 15 times lower than the standard of 0.15 µg/m^3.

In summary, this review of ambient air quality data collected during recent years in the NGS region indicates that air quality conditions in the region meet the NAAQS.

3.3.3.1.3 On-Site Monitoring at the KM

On-site monitoring has been performed at the KM for PM_{10}, $PM_{2.5}$, NO_2, and O_3. Multiple PM_{10} monitors have operated for approximately 2 decades; two NO_2 monitors have operated for 3 years; one O_3 monitor has recorded data for 3 years; and three $PM_{2.5}$ monitors have been in operation for 4 years. All monitored concentrations are in compliance with the NAAQS (OSMRE 2017).

3.3.3.1.4 Visibility and Regional Haze

Visibility is a critical resource value in this region, particularly at the regional Class I areas. Aerosols in the atmosphere scatter and absorb light. Multiple pollution species contribute to the total light extinction as measured at the Interagency Monitoring of Protected Visual Environments (IMPROVE) monitors. These data represent a calculated value applied to the total atmospheric aerosol extinction (CSU 1993) on

a logarithmic scale that is intended to represent human perception of regional haze. Pristine conditions would be represented with a deciview value of zero. Deciview is a measurement of visibility impairment and is a haze index calculated from light extinction. A change in deciviews of 1 would represent a small but noticeable change in haziness under most circumstances when viewing scenes in Class I areas (CSU 1993).

Existing regional visibility was assessed using monitoring data from six IMPROVE Network sites. The IMPROVE program was initiated in 1985 to establish current visibility conditions and trends in national parks and wilderness areas. Data for the 20 percent least hazy days (lowest deciview levels), the average day, and the 20 percent haziest days (highest deciview levels) for the period from 2010 to 2014 are provided in Appendix 3.

As with air quality conditions, there is notable variability in the data from year to year, but no clear trend at any of the sites or in any levels of haziness. The average regional visibility levels are also shown in Appendix 3; these indicate no clear trend.

3.3.4 Environmental Consequences

This section describes the direct and indirect effects of the No Action alternative, followed by the effects of the Proposed Action, and then the cumulative effects of the Proposed Action.

3.3.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.

3.3.4.1.1 NGS and Associated Facilities

The retirement activities of the NGS and associated facilities, which are described in Section 2.4.1.1 include but are not limited to demolition of existing structures, buildings, and utilities (except those that the Nation requests to retain); removal or closure of ponds and landfills; surface restoration through revegetation and modification of the existing topography; and demolition and removal of the overhead catenary system, electrical distribution lines, supporting superstructure, concrete foundations, and transformers of the railroad. The railroad track and related facilities would not be removed and instead would be retained for potential future use by the Nation.

Retirement activities would require use of a variety of heavy equipment including cranes, loaders, dozers, scrapers, and excavators. Blasting would be used in the demolition of some structures. The primary air emissions from these operations would be fugitive dust emissions, and vehicle and equipment exhaust emissions.

Fugitive dust emissions can be generated from a number of retirement activities including but not limited to land clearing, coal removal, building demolition, drilling and blasting, ground excavation, earth moving, land reclamation, and vehicle traffic on unpaved roads (Countess Environmental 2006). The magnitude of emissions would depend on the type and number of heavy equipment used, the total hours of operation, the type of operation, the geographical extent of the activity, the meteorological conditions, and the properties of the materials being handled (e.g., silt and moisture content). High winds would lead to fugitive dust emissions from disturbed lands and stockpiles. Thus, the magnitude of fugitive dust emissions would depend on a number of factors and would vary over the course of retirement activities,

but the air quality impacts would be localized and limited to the period in which retirement activities are ongoing. Furthermore, best management practices for dust control would be adopted to minimize emissions and air quality impacts.

Heavy vehicle and equipment use would result in engine exhaust emissions of CO, NO_2, and SO_2, as well as DPM. The use of explosives in demolition blasting would result in CO, NO_2, and SO_2 emissions in addition to fugitive dust. Both of these emissions categories would be limited to the period of retirement activities and localized to the plant site, with negligible impacts beyond the plant site.

3.3.4.1.2 KM

Because the NGS is the only commercial customer of coal from the KM, the retirement of the mine would coincide with the closure and retirement of the NGS and would be performed according to the provisions of the approved mine permit application package and SMCRA regulations (OSMRE 2017 and 2017b) to restore the surface to a comparable natural habitat of the area. Upon shutdown of the mine, reclamation operations would continue to contribute to cumulative criteria pollutants near the mine until PWCC's reclamation obligations are met. Facilities would be dismantled or demolished with materials being either salvaged or buried. Concrete foundations and sub-bases would be also be removed or buried, and the surfaces would be reclaimed through grading, soil sampling, subsoil and topsoil replacement, and revegetation through seeding. Emissions would be associated with heavy equipment operation engine exhaust and fugitive dust emissions associated with wind erosion and overburden replacement including soil transfers, bulldozing, grading, and topsoil replacement. Emissions during reclamation activities would be less than during active mining. Impacts would be localized and likely well below the ambient air quality standards.

3.3.4.1.3 STS and WTS on Navajo Tribal Trust Lands

Under the No Action alternative, it is likely the NGS Lessees would enter into negotiations with the Nation to ensure continuation of STS and WTS operations, including communication sites on Navajo Tribal Trust Lands, in a manner similar to how they are currently operated and maintained. In that case, the air resource impacts would be the same as the Proposed Action (Section 3.3.4.2.3). In the unlikely event that arrangements cannot be agreed upon regarding continued operation and maintenance, retirement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands would be completed by the end of December 2019 and disturb approximately 1,280 acres. The retirement activities, described in Section 2.4.3, would have similar impacts as described above in Section 3.3.4.1.1, except no blasting is anticipated and the construction activities would be short duration and localized at each tower. BMPs would be implemented to control and limit fugitive dust. Thus, actions would result in localized emissions along the transmission corridors that would likely be well below the ambient air quality standards.

3.3.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. Impacts from these operations and retirement are discussed in the following sections.

3.3.4.2.1 NGS and Associated Facilities

This section includes a summary of emission rates and impacts of both criteria air pollutants (CAPs) and hazardous air pollutants (HAPs) from NGS operations (impacts of retirement are analyzed in a separate section below). For this assessment, the average historical 3 unit heat input (2001 to 2008) was used in

estimating emissions (Ramboll Environ 2016b). Detailed descriptions of the emissions data, control technology assumptions, modeling setup and configuration, and impacts are provided in Ramboll Environ (2016b and 2016c) for the NGS and support operations.

Sources and Emissions

The largest sources of CAPs and HAPs at the NGS facility are the electric generating units (EGUs). Each of the three units utilize low NOx burners and separated overfire air to reduce NOx emissions, an electrostatic precipitator for PM control, and a wet limestone slurry scrubber downstream of the electrostatic precipitator for SO_2 and PM control. The coal used in the boilers is treated with calcium bromide to control mercury emissions. The estimated CAP emissions from the boilers from coal combustion and oil combustion (used for start-up) are provided in Table 4.

Table 4. Projected Annual CAP Emissions from EGUs Main Boiler Stacks—3 Unit Operation.

Pollutant	Annual Emissions* (tons/year)	
	Coal-Fired	Oil-Fired (start-up)
NOx	20,409.18	12.09
SO_2	9,718.65	0.14
PM_{10}	2,070.06	0.00
$PM_{2.5}$	1,486.95	0.00
CO	14,577.99	2.52
VOC	244.02	0.10

*Note that all zero values are due to rounding. Minor emissions are released.
VOC = Volatile organic compounds.
Source: Ramboll Environ 2016b.

Per EPA's 2011 National Emission Inventory (EPA 2014a), emissions of criteria pollutants from the NGS at the maximum firing rate would range from 0.01 percent (volatile organic compounds (VOCs)) to 12.64 percent (SO_2) of the Arizona total emissions and from 0.0014 percent (VOCs) to 0.1513 percent (SO_2) of the national total emissions.

Support equipment and operations at the NGS are also sources of air emissions, and the estimated emissions from each source category are provided in Table 5.

Table 5. Projected CAP Emissions from NGS Support Equipment (tons/year).*

Source	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO	VOC
Water cooling towers	--	--	0.86	0.02	--	--
Auxiliary boilers	0.48	0.14	0.02	0.00	0.10	0.00
Coal handling and storage (no coal pile)	--	--	0.21	0.03	--	--
Coal handling and storage	--	--	0.63	0.10	--	--
Limestone handling and storage	--	--	0.09	0.01	--	--
Limestone handling and storage (dust collectors)	--	--	1.47	0.40	--	--
Fly ash handling (no disposal)	--	--	7.82	1.18	--	--
Fly ash handling (with disposal)	--	--	0.24	0.04	--	--
Soda ash/lime handling	--	--	0.17	0.03	--	--
Fugitives—mobile	--	--	50.10	5.85	--	--
Fugitives—coal bulldozing	--	--	8.94	0.73	--	--
Fugitives—welding	--	--	0.10	0.10	--	--
Fugitives—abrasive blasting	--	--	0.44	0.04	--	--
Emergency generators	8.47	0.56	0.60	0.60	1.83	0.68
Fuel storage tanks	--	--	--	--	--	1.77
Diesel yard switcher locomotive	0.13	0.00	0.00	0.00	0.23	0.01
Nonroad equipment exhaust on roads	35.18	0.31	2.25	2.01	14.95	3.29
On-road vehicles exhaust on roads	1.04	0.00	0.06	0.04	3.32	0.18
Nonroad equipment at landfills	1.00	0.02	0.08	0.07	0.49	0.08
On-road vehicles at landfills	0.00	0.00	0.00	0.00	0.00	0.00
Wind erosion of coal, ash, and limestone piles	--	--	28.17	4.23	--	--

*Note that all zero values are due to rounding. Minor emissions are released.

The total annual and maximum hourly HAP emissions from NGS operations are provided in Table 6 and include emissions from EGUs (coal and oil combusted in Units 1, 2, and 3), auxiliary boilers, coal handling and storage, ash (CCR) handling and disposal, fugitives, emergency generators, fuel storage tanks, the yard-switcher locomotive, nonroad and on-road mobile sources, and wind erosion of the ash (CCR) disposal area and coal storage piles. Cooling towers and limestone and soda ash/lime handling were not considered as sources of HAPs. Detailed descriptions of the methods used for estimating HAP emissions from the NGS and source-specific HAP emission rates are provided in Ramboll Environ (2016b).

Table 6. Total Annual HAP Emissions from NGS Operations by Pollutant.

Pollutant	Annual Emissions (tons/yr)	Max Hourly Emissions (lb/hr)*
Aluminum	1.28E+00	5.31E+01
Antimony	1.38E-04	3.09E-04
Arsenic	1.34E-01	1.07E-01
Barium	3.67E+00	1.39E+01
Beryllium	2.39E-02	6.00E-02
Boron	1.75E-02	1.08E+00
Cadmium	2.44E-04	5.01E-04
Chromium	2.88E-01	2.19E-01
Chromium (VI)	3.43E-02	2.61E-02
Cobalt	7.30E-02	1.01E-01
Copper	3.44E-01	4.29E-01
Iron	2.72E+00	1.46E+02
Lead	3.29E-01	3.46E-01
Manganese	5.60E-01	7.23E-01
Mercuric chloride	7.46E-03	1.71E-03
Mercury (total)	1.17E-01	2.97E-02
Methylmercury	3.66E-08	2.25E-06

Pollutant	Annual Emissions (tons/yr)	Max Hourly Emissions (lb/hr)*
Molybdenum	2.03E-01	6.24E-02
Nickel	5.48E-01	6.79E-01
Selenium	2.24E+00	6.13E-01
Silver	1.58E-02	4.07E-03
Vanadium	5.80E-03	4.42E-02
Zinc	2.95E+00	1.14E+00
1,2,3,4,6,7,8 - Heptachlorodioxin	5.44E-07	1.27E-07
1,2,3,4,6,7,8 - Heptachlorofuran	1.26E-07	2.94E-08
1,2,3,4,6,7,8,9 - Octachlorodioxin	2.04E-06	4.70E-07
1,2,3,4,6,7,8,9 - Octachlorofuran	2.14E-07	4.89E-08
1,2,3,4,7,8 - Hexachlorodioxin	3.50E-08	8.59E-09
1,2,3,4,7,8 - Hexachlorofuran	5.84E-08	1.38E-08
1,2,3,4,7,8,9 - Heptachlorofuran	1.07E-08	2.48E-09
1,2,3,6,7,8 - Hexachlorodioxin	2.24E-07	5.18E-08
1,2,3,6,7,8 - Hexachlorofuran	3.50E-08	8.47E-09
1,2,3,7,8 - Pentachlorodioxin	9.56E-09	3.56E-09
1,2,3,7,8 - Pentachlorofuran	2.14E-07	4.95E-08
1,2,3,7,8,9 - Hexachlorodioxin	8.37E-08	2.01E-08
1,2,3,7,8,9 - Hexachlorofuran	2.92E-08	6.66E-09
2,3,4,6,7,8 - Hexachlorofuran	5.64E-08	1.32E-08
2,3,4,7,8 - Pentachlorofuran	4.87E-08	1.20E-08
2,3,7,8 - Tetrachlorodioxin	1.46E-08	3.99E-09
2,3,7,8 - Tetrachlorofuran	2.53E-07	5.84E-08
2-Methylnaphthalene	8.26E-03	1.38E-01
Acenaphthene	1.18E-03	7.29E-03
Acenaphthylene	3.12E-04	7.12E-05
Acrolein	3.41E-01	7.96E-02
Anthracene	6.26E-04	1.08E-02
Benzene	2.99E-01	2.31E-01
Benzo(a)anthracene	2.12E-04	6.11E-03
Benzo(a)pyrene	2.38E-04	3.57E-03
Benzo(b)fluoranthene	8.93E-05	5.17E-03
Benzo(g,h,i)perylene	2.45E-04	1.62E-03
Benzo(k)fluoranthene	2.74E-05	1.32E-03
Chrysene	1.42E-04	8.73E-03
Dibenz(a,h)anthracene	2.92E-04	6.66E-05
Fluoranthene	1.91E-03	2.02E-02
Fluorene	2.08E-03	2.64E-02
Indeno(1,2,3-cd)pyrene	1.53E-04	1.12E-04
Naphthalene	3.61E-02	1.02E-01
Phenanthrene	6.50E-03	4.67E-02
Pyrene	2.83E-03	1.84E-02
Hydrogen chloride	7.51E+00	2.30E+00
Hydrogen fluoride	5.19E+00	1.27E+00
Sulfuric acid	4.72E+01	1.14E+01
DPM (PM_{10}-based)	2.73E+00	1.41E+01

Source: Ramboll Environ 2016b.

BM&LP Railroad

The BM&LP Railroad is a 50-kV electric train with 100-ton-capacity bottom-dump hopper cars that delivers the crushed, low-sulfur, bituminous coal from the KM to the NGS. Under the Proposed Action, it would continue to operate as it has historically until retirement activities begin. The railroad operates on

electric power provided by the NGS, and thus the emissions produced from powering the railroad are already accounted for in NGS emissions. Other potential sources of air emissions from railroad operation include fugitive coal dust emissions during railroad transport and unloading, and routine and emergency maintenance and repair.

Coal fugitive dust emissions during unloading have already been accounted for in the NGS emission inventory. Coal fugitive dust emissions during railroad transport due to wind erosion were assessed, and it was determined that air quality impacts from these emissions are unlikely due to the implementation of effective control measures at the mine, such as improved railcar loading techniques (Ramboll Environ 2016a, 2016d). Therefore, coal dust emissions from wind erosion of coal during railroad transport between the mine and the NGS are minimal (Ramboll Environ 2016a, 2016d). Emissions and environmental impacts from routine and emergency maintenance and repair would be negligible because these impacts would be infrequent, short in duration, and localized.

Air Quality Impacts from the NGS and Associated Facilities

Impacts on ambient air quality near the NGS were evaluated using a near-field air dispersion and deposition modeling analysis to estimate the potential local air quality impacts for receptors up to 50 km from the NGS for the 2 years of operations (2018-2019). The modeling analysis included air emissions of CAPs and HAPs associated with the NGS and the ash (CCR) disposal area as described above. Modeling was conducted with AERMOD (Version 14134) in accordance with the EPA Guideline on Air Quality Models, as incorporated in Appendix W of 40 CFR Part 51. Details of the modeling assumptions, setup, and input parameters are provided in Ramboll Environ (2016c).

Results of the AERMOD modeling analysis for the NGS 3-Unit Operation are provided in Table 7. The analysis focuses on comparing the modeled impacts with the NAAQS, considering the emissions from the NGS and from background sources. The highest impacts tend to occur in the immediate vicinity of the NGS for all criteria pollutants except SO_2, and are dominated by impacts from surface level sources that operate within the NGS facility (e.g., vehicle emissions and emissions from fuel burning equipment associated with coal handling). Impacts from SO_2 emissions are dominated by the main boiler stack plumes, with maximum impacts occurring approximately 8.3 km southeast of the NGS. This maximum appears to coincide with Liche-E Rock, which rises abruptly to an elevation of 1,798 meters.

Overall, the analysis demonstrates compliance with the NAAQS for all CAPs. The results are a conservative estimate of actual impacts because the dispersion model calculations include conservative technical approaches that provide results that likely overestimate impacts.

Table 7. Modeled Air Quality Impacts from AERMOD 3-Unit Operation.

Pollutant	Primary or Secondary Standard (µg/m^3)	Averaging Time	Modeled Impact[1] (µg/m3)	Background (µg/m3)	Total Impact[1]	Location of Max Impact[2]	% of NAAQS
SO_2	196	1-hr	141.1	22.5	163.6	8267, ESE	83%
SO_2	1,300	3-hr	81.4	24.6	106.0	8375, SE	8%
NO_2	188	1-hr	186.3	varies[3]	186.3	844.6, ESE	99%
NO_2	100	Annual	14.4	6.0	20.4	807.8, ESE	20%
CO	40,000	1-hr	746.5	3664.0	4410.5	850.6, ESE	11%
CO	10,000	8-hr	154.6	2633.5	2788.1	822.8, ESE	28%
PM_{10}	150	24-hr	94.4	44.5	138.9	826.8, ESE	93%
$PM_{2.5}$	35	24-hr	11.9	20.8[4]	32.7	826.8, ESE	94%
$PM_{2.5}$	12	Annual	1.8	5.9[5]	7.6	807.8, ESE	64%
Lead	0.15	Quarterly	0.0007	0.0100	0.0107	808.6, ESE	7%

[1] Maximum modeled impacts for NAAQS compliance based on the greater of the pre-selective catalytic reduction (SCR) and post-SCR model-calculated results (used as a conservative measure based on available data).
[2] Simple direction and distance in meters from the NGS middle stack.
[3] NO_2 1-hour was modeled in AERMOD with seasonal, hourly background values. SO_2 modeled concentration already includes the background.
[4] $PM_{2.5}$ 24-hour background includes 1.0 µg/m³ secondary aerosol formation.
[5] $PM_{2.5}$ annual background includes 0.26 µg/m³ secondary aerosol formation.
Source: Ramboll Environ (2016c).

As noted above, the AERMOD model was used to determine air quality concentrations and deposition rates for HAPs emitted from the NGS, including both the main stack and process/handling emissions (Ramboll Environ 2016c). Table 8 provides the maximum impact at any receptor within 50 km from the NGS for both ambient air quality impacts and deposition rates due to NGS emissions. The maximum impacts are located at or near the NGS ambient air boundary and decrease rapidly with distance from the NGS boundary (Ramboll Environ 2016c). These impacts due to HAP emissions from the NGS are used to assess human health and ecological risk in Section 3.13 and Sections 3.9 and 3.10, respectively.

Table 8. Maximum Impact and Deposition of HAPs from NGS Emissions.

Chemical	Maximum Air Impact (µg/m^3)	Maximum Deposition (µg/m^2-yr)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.63E-11	4.99E-06
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.99E-10	2.15E-05
1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.91E-12	4.22E-07
1,2,3,4,7,8-Hexachlorodibenzofuran	2.14E-11	2.31E-06
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.28E-11	1.39E-06
1,2,3,6,7,8-Hexachlorodibenzofuran	1.28E-11	1.38E-06
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	8.19E-11	8.83E-06
1,2,3,7,8,9-Hexachlorodibenzofuran	1.07E-11	1.15E-06
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	3.06E-11	3.31E-06
1,2,3,7,8-Pentachlorodibenzofuran	7.83E-11	8.44E-06
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	3.45E-12	3.84E-07
2,3,4,6,7,8-Hexachlorodibenzofuran	2.06E-11	2.23E-06
2,3,4,7,8-Pentachlorodibenzofuran	1.78E-11	1.92E-06
2,3,7,8-Tetrachlorodibenzofuran	9.25E-11	9.98E-06
2,3,7,8-Tetrachlorodibenzo-p-dioxin	5.34E-12	5.81E-07
2-Methylnaphthalene	2.38E-05	9.48E+01
Acenaphthene	1.30E-06	4.91E+00

Chemical	Maximum Air Impact (µg/m^3)	Maximum Deposition (µg/m^2-yr)
Acenaphthylene	1.14E-07	1.28E-02
Acrolein	1.29E-04	1.74E+01
Aluminum	2.83E-02	5.53E+04
Anthracene	1.85E-06	7.36E+00
Antimony	1.08E-05	9.54E+00
Arsenic	3.73E-05	8.80E+01
Barium	1.43E-03	1.39E+04
Benzene	2.21E-03	3.00E+02
Benzo(a)anthracene	1.04E-06	4.18E+00
Benzo(a)pyrene	6.06E-07	2.40E+00
Benzo(b)fluoranthene	8.74E-07	3.55E+00
Benzo(g,h,i)perylene	2.74E-07	1.04E+00
Benzo(k)fluoranthene	2.13E-07	8.66E-01
Beryllium	6.74E-06	5.84E+01
Boron	5.07E-05	1.12E+03
Cadmium	1.17E-05	1.44E+01
Chromium (total)	2.54E-04	1.80E+02
Chromium VI	9.33E-06	2.14E+01
Chrysene	1.50E-06	6.08E+00
Cobalt	2.01E-05	9.30E+01
Copper	1.42E-04	3.89E+02
Dibenz(a,h)anthracene	1.07E-07	1.15E-02
Diesel particulate matter	5.94E-01	-- [a]
Fluoranthene	3.47E-06	1.36E+01
Fluorene	4.58E-06	1.80E+01
Hydrogen chloride	2.82E-03	-- [a]
Hydrogen fluoride	1.97E-03	1.28E+01
Indeno(1,2,3-cd)pyrene	5.34E-08	6.43E-03
Iron	2.90E-02	1.51E+05
Lead	2.87E-04	3.03E+02
Manganese	2.07E-03	6.62E+02
Mercury (total)	2.74E-06	1.26E+00
Molybdenum	5.53E-05	5.99E+01
Naphthalene	2.48E-04	1.84E+01
Nickel	1.68E-04	6.14E+02
Octachlorodibenzofuran	7.83E-11	8.44E-06
Octachlorodibenzo-p-dioxin	7.47E-10	8.06E-05
Phenanthrene	8.21E-06	3.14E+01
Pyrene	3.25E-06	1.23E+01
Selenium	6.04E-04	6.55E+02
Silver	5.34E-06	1.37E+01
Sulfuric acid	1.21E-01	-- [a]
Vanadium	1.19E-04	9.41E+01
Zinc	9.63E-04	1.06E+03

[a] Chemical only evaluated for inhalation pathway; deposition rate is not needed.
Source: Ramboll Environ (2016c).

Regional Ozone Compliance

Several ozone monitors throughout the states of Arizona and Utah were evaluated for NAAQS compliance and subsequent attainment/non-attainment designation. Data from seven regional monitors were gathered to examine ozone concentrations surrounding the NGS and the KM: Flagstaff, Arizona;

Grand Canyon, Arizona; Petrified Forest, Arizona; Escalante National Monument, Utah; Canyonlands National Park, Utah; Hurricane, Utah; and Zion National Park, Utah. Table 9 demonstrates the fourth highest of the 8-hour daily maximums beginning in 2011 through 2014. Note that the NAAQS standard was 75 parts per billion (ppb) during 2011 through 2014 and lowered to 70 ppb in 2015. The concentrations recorded at the ozone monitoring stations represent both past and present NGS full operations.

Table 9. Ozone Monitoring Results from 2011 through 2014.

Parameter	Site Location	2011	2012	2013 (3-year average)	2014 (3-year average)	Standard
Ozone 4th highest 8-hour daily maximum (data in ppb)	Flagstaff, AZ	68	72	69 (69)	73 (71)[1]	70 ppb (current) 75 ppb during 2011 to 2014
	Grand Canyon, AZ	74	73	69 (72)[1]	69 (70)	
	Petrified Forest, AZ	69	73	69 (70)	68 (70)	
	Escalante National Monument, UT	--	68	67 (67)	60 (65)	
	Canyonlands National Park, UT	69	72	66 (69)	67 (68)	
	Hurricane, UT	68	59	69 (65)	70 (66)	
	Zion National Park, UT	72	75	70 (72)[1]	69 (71)[1]	
	Average	70.0	70.3	68.4	68.0 (68.7)	

[1] Meets 2008 NAAQS; exceeds 2015 NAAQS, which is applicable to future ambient air concentrations.

Ozone standards are based on the fourth highest value averaged over a 3-year period for the 8-hour averaging period. For all monitor locations at the time of measurement, the ambient concentration values indicate that the region is in compliance with the ozone NAAQS, suggesting that proposed rates of coal combustion emissions would not produce exceedances of the NAAQS.

Visibility

Impacts on visibility in Class I areas from NGS operation were taken from the EPA Better than Best Available Retrofit Technology (BART) Alternative Federal Implementation Plan. The Federal Implementation Plan addressed requirements for installation of BART controls on the NGS to improve visibility in 11 Class I areas within the analysis area. However, the BART pollution controls and measures would not be implemented because the NGS would shut down at the end of December 2019. The NGS would no longer be a source of emissions except for the short-term and temporary emissions during 2 years of operation; thus, this meets the long-term (2060) objective of EPA regulations to reduce visibility impacts. EPA's analysis of impacts at the 11 Class I areas is provided in the Federal Register (78 FR 8287) for the original BART analysis. As shown in Table 10, the impacts range from 1.3 to 8.4 dV.

Table 10. NGS Visibility Impacts Modeled by EPA.

Class I Area	Distance to NGS (km)	NGS Impact[1] (dV)
Arches National Park	245	4.5
Bryce Canyon National Park	96	4.9
Canyonlands National Park	173	6.0
Capitol Reef National Park	90	7.7
Grand Canyon National Park	29	8.4
Mazatzal Wilderness Area	279	1.5
Mesa Verde National Park	253	3.2
Petrified Forest National Park	235	3.4
Pine Mountain Wilderness Area	287	1.3
Sycamore Canyon Wilderness Area	204	2.4
Zion National Park	134	4.4

[1] From 98th percentile delta deciviews (pre-selective catalytic reduction (SCR)).
Source: 78 FR 8287.

The NGS is not a PSD increment consuming facility. As a result, its impacts on ambient air quality in Class I areas were not evaluated for comparison to those Class I increments. The existing ambient air quality conditions at those locations already reflect the impacts from historic and ongoing operations at the NGS.

Plume Blight

Plume blight is defined as visual impairment of air quality that manifests itself as a coherent plume. This results from specific sources, such as a power plant smoke stack, emitting pollutants into a stable atmosphere. The pollutants are then transported in some direction with little or no vertical mixing (Malm 1999). Under stable meteorological conditions and current emissions, a viewer facing the NGS plume from vantage points within 50 km of the NGS may see a discreet plume for some distance from the stack, though short-term and temporary. Features of the plume will vary as a function of meteorological conditions and viewer position and distance from the facility.

Indirect Impacts from NGS Support Activities

Indirect air quality effects from the Proposed Action would largely include the continued delivery of materials and chemicals to the NGS, as well as hauling of coal combustion residuals off-site to customers or to a separate landfill. Under the Proposed Action, the NGS could continue to operate up to December 22, 2019, receiving chemicals and support products.

The effect of indirect activities in support of the NGS would be minor because the air quality effects of materials delivery would involve traffic on public highways, and emissions would have transient impacts at any specific location.

3.3.4.2.2 KM

As discussed in Sections 2.3.2.1 and 2.3.2.2, the KM has historically provided all of the coal used by the NGS and would continue to do so under the Proposed Action alternative until retirement activities began. In this section, the emissions and air quality impacts of operations at the KM are discussed based on the assessment performed for the 5-year period 2015 to 2020 for the KM EA (OSMRE 2017; MMA 2016).The emissions and impacts resulting from the continued operation of the mine are considered indirect effects of the Proposed Action. The emissions and air quality impacts of the retirement of the mine are discussed separately in Section 3.3.4.1.1, Retirement of KM.

Sources and Emissions

KM operations include a wide array of air emission sources related to coal mining, handling, and processing. Emissions of CAPs are generated by mining operations (coal and overburden removal and transport), coal preparation plant activities (coal transfers, crushing, screening, stockpiling), and wind erosion of stockpiles and of disturbed areas. The majority of these emissions consist of fugitive and process particulate matter (total suspended particulates [TSP], PM_{10}, and $PM_{2.5}$). Other CAPs (NOx, CO, and SO_2) are generated by blasting and from tailpipe exhaust from mining equipment and haul trucks.

CAP emissions from the mine were estimated using mine plan maps and annual operating parameters provided by PWCC (MMA 2016), and emission factors from AP-42 (EPA 1995) and the Wyoming Department of Environmental Quality (1979). Then, the years 2016 and 2019 were chosen as worst-case years for emissions and modeling analyses based on the proximity of mining activities relative to permit boundaries and the highest estimated total PM emissions, respectively. Details of the emission calculations for each source category and source level emissions are provided in MMA (2016) and the KM EA (OSMRE 2017). Annual emission rates are provided in Table 11 for the worst-case years of the period studied.

Table 11. Annual Criteria Air Pollutant Emissions from the KM (Tons/Year).

2016	PM_{10}	$PM_{2.5}$	NOx	CO	SO_2
Coal prep facilities	47	6	--	--	--
Mining fugitives	675	89	--	--	--
Scoria fugitives	4	1	--	--	--
Blasting	--	--	142	562	0.1
Equip exhaust	19	19	475	156	0.6
Total	**745**	**115**	**617**	**718**	**0.7**
2019	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**CO**	**SO_2**
Coal prep facilities	48	6	--	--	--
Mining fugitives	695	91	--	--	--
Scoria fugitives	4	1	--	--	--
Blasting	--	--	147	580	0.1
Equip exhaust	13	13	438	107	0.6
Total	**760**	**111**	**585**	**687**	**0.7**

Source: OSMRE 2017.

The operations at the mine are also a source of HAPs, and the primary sources are fugitive dust emissions from coal and overburden handling, processing, and transport, and DPM from heavy diesel equipment used at the mine. Coal and overburden contain a number of COPCs including metals and polycyclic aromatic hydrocarbons (PAHs), and DPM is considered a carcinogenic air toxic (EPA 2002). The total PM_{10} emissions from coal and dirt sources were used in AERMOD to determine impacts of COPCs in coal and overburden on air concentrations and deposition rates. The predicted PM_{10} air concentrations and deposition fluxes resulting from these sources were scaled by the 95 percent upper confidence limit (UCL) of mean concentration of each COPC in coal and overburden to estimate their impact (MMA 2016). DPM air concentrations were predicted using PM_{10} tailpipe emissions from the mine with $PM_{2.5}$ deposition parameters to be conservative.

Air Quality Impacts

EPA's AERMOD dispersion model was used to estimate the impacts of the mine on ambient air quality concentrations within 50 km of the mine. The modeled concentrations resulting from mine emissions were added to background concentrations to yield the projected design concentrations and allow for direct comparison to the NAAQS. The maximum modeled impacts are presented in Table 12. All modeling results demonstrate compliance under worst-case conditions (2016 operations closest to the ambient boundary and 2019 maximum particulate emissions). The majority of averaging period impacts are less than 70 percent of the NAAQS, demonstrating that for those criteria pollutants, there would be negligible effects from the mining operations at the mine under the Proposed Action. The 1-hour NO_2 and 24-hour PM_{10} impacts would be 75.9 percent and 77.5 percent of the standards, respectively, suggesting a minor impact on those two metrics. Because impacts of the NGS are included in background concentrations, the projected future design concentrations represent the combined impacts of the NGS, the KM, and all existing regional sources. Because there are no known or foreseeable future sources within the region, the calculated future concentrations are also representative of existing and future cumulative impacts.

The highest predicted design concentrations are found to occur along Navajo Route 41 within the Permit Area, along the western permit boundary near the N-8 coal preparation area, and along the permit boundary adjacent to active mining areas. The highest predicted impacts at residences within the Permit Area are lower and well within the NAAQS. Predicted concentrations decrease rapidly with distance from the coal handling and active mine regions, with off-site concentrations decreasing to near-background levels within 10 km of the KM.

Table 12. Maximum Modeled Air Quality Impacts of the KM within 50 km.

Pollutant	Averaging Time	Modeled Impact Concentration[1] ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Design (Total) Concentration[2] ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	24-hr	82.48	33.70	116.18	150
$PM_{2.5}$	24-hr	9.69	13.00	22.69	35
$PM_{2.5}$	Annual	1.67	4.70	6.37	12
NO_2	1-hr	142.74	included	142.74	188
NO_2	Annual	13.15	5.64	18.79	100
CO	1-hr	185.54	1955.00	2140.54	40,000
CO	8-hr	4194.87	1495.00	5689.87	10,000
SO_2	1-hr	0.48	22.7	23.18	196
SO_2	3-hr	1.16	19.10	20.26	1,300
SO_2	24-hr	0.38	6.80	7.18	365
SO_2	Annual	0.02	4.90	4.92	80

[1] PM_{10} 24-hour: highest 6th-high over 5 years.
$PM_{2.5}$ 24-hour: 5-year mean of the highest 8th high.
$PM_{2.5}$ annual: maximum of the 5-year mean.
NO_2 1-hour: 5-year mean of 8th highest daily maximum.
SO_2 1-hour: 5-year mean of the 4th highest daily maximum.
SO_2 3-hour and 24-hour; CO 1-hour and 8-hour: highest 2nd-high over 5 years.
NO_2 and SO_2 annual: maximum annual over 5 years.
$\mu g/m^3$ = micrograms per cubic meter.
[2] Design concentrations is the sum of modeled impact concentration and background concentration.

Per the 2011 National Emissions Inventory (NEI) (EPA 2014a), the state of Arizona generated 178,231 tons of $PM_{2.5}$ and 406,993 tons of PM_{10}. National emissions were 6.1 million tons of $PM_{2.5}$ and 20.7 million tons of PM_{10}. The $PM_{2.5}$ emissions associated with the mine emissions contribute 0.06 percent and 0.002 percent of the state and national totals, respectively. Similarly, PM_{10} emissions from the mine contribute 0.19 percent and 0.004 percent when compared to the state and national totals, respectively. Gaseous pollutants from the mine when compared to the state or nation do not exceed 0.23 percent or 0.004 percent, respectively. Based on the percentage comparison and the modeled concentrations, the potential impacts of all criteria pollutants from the continued operation of the mine would be negligible under the Proposed Action.

Modeling was also conducted to predict air concentration and surface deposition of 40 COPCs, consisting of 22 metals, 17 PAHs, and DPM. Modeling was performed for discrete residential receptor sites and provided 1-year mean annual and 5-year mean annual deposition fluxes and air concentrations for each COPC using TSP and PM_{10} model results, respectively, at each receptor location. These modeling analyses were conducted for the worst-case years 2016 and 2019, and showed minimal impacts. Modeling was also performed for year 2019 (the highest emission year) to estimate 5-year mean annual particulate mercury and selenium deposition on the drainage basins around the NGS using TSP emissions. Modeled impacts were predicted to be negligible (MMA 2016).

3.3.4.2.3 STS and WTS on Navajo Tribal Trust Lands

Under the Proposed Action, the operation and maintenance of the STS, WTS, and communication sites would continue for 35 years until the end of the Extension Lease term in 2054, and the air emissions and impacts from the continued operation of these systems and sites on Navajo Tribal Trust Lands are considered direct effects of the Proposed Action. Maintenance activities for the transmission lines, communication sites, and access roads would result in exhaust emissions and fugitive dust emissions from vehicle traffic on unpaved roads. However, these activities would be infrequent, of short duration, and/or localized (SRP 2017d). For example, transmission line structure maintenance and repair would occur on an as-needed basis; routine actions such as vegetation clearing would occur once every 5 years, or less

frequently depending on need; repair of access roads and transmission tower infrastructure would occur along localized sections of the lines or roads; and maintenance of access roads would occur once or twice a year, but equipment would move through the areas quickly. Thus, emissions of criteria pollutants associated with small transmission line maintenance crews would be widely dispersed in space and time. Therefore, emissions from future operations and maintenance would be minor, and impacts from emissions from future operations would be infrequent, of short duration, and localized. Retirement of the STS and WTS on Navajo Tribal Trust Lands is discussed in Section 3.3.4.1.3.

3.3.4.2.4 Retirement of the NGS, KM, and STS and WTS

The annual emissions and air quality impacts during retirement activities for both the NGS and the KM in the Proposed Action would be comparable to those in the No Action alternative, albeit over a longer time period for the NGS (5 years instead of 3 years).

Retirement of the STS and WTS on Navajo Nation Tribal Trust Lands would occur either over a 2-year period at the end of the Extension Lease term in 2054, or after an additional 35 years of operation. Emissions from the retirement of the transmission systems and communication sites would be similar to those under the No Action alternative. Air emissions impacts from retirement activities are discussed in Section 3.3.4.1.

3.3.5 Cumulative Effects

As described in Section 3.3.3.1, regional air quality is good with no non-attainment areas within 300 km of the NGS. There are no reasonably foreseeable new sources of air emissions within the 50-km Near-Field AERMOD modeling area. Other major emission sources within the 300-km region include coal-fired and natural gas power plants, oil and gas compressor stations and gas processing plants, cement plants, and other industrial sources (Appendix 3). Emissions from regional urban sources as well as pollutants transported over long distances (e.g., mercury from China) were included in the monitored background concentrations.

3.3.5.1 CAPS

The maximum modeled concentrations of NO_2, CO, SO_2, PM_{10}, $PM_{2.5}$, and lead from the Proposed Action were in compliance with NAAQS within 50 km of the NGS (Table 7). The maximum modeled impacts within 50 km of the KM are also well within the NAAQS with off-site concentrations decreasing to near-background levels within 10 km of the mine (Table 12). There are no identified existing permitted nearby sources and no reasonably foreseeable new sources within the 50-km Near-Field modeling analysis area that would affect the highest predicted concentrations near the NGS or the mine.

Table 13 presents a summary of the cumulative results at Near-Field air modeling receptors 50 km away from the NGS (Ramboll Environ 2016c). The results show that estimated cumulative concentrations are much lower than the NAAQS at 50 km. The Near-Field modeling results from AERMOD are conservative especially with regard to the 1-hour standards as they reflect worst-case meteorological conditions and maximum emission rates. Also, it is very unlikely that peak concentrations from the NGS would overlap both in time and space with the peak contributions of other cumulative sources that are farther away and potentially subject to different wind patterns. Therefore, it is highly unlikely that the NGS would contribute to cumulative concentrations near the NAAQS at distances beyond 50 km.

Table 13. Cumulative Results from Near-Field Modeling for Receptors 50 km from the NGS.

Pollutant	Primary or Secondary Standard (µg/m^3)	Averaging Time	Highest Predicted Conc. due to NGS at 50 km in Any Direction[1] (µg/m^3)	Background (µg/m^3)	Cumulative Conc. (µg/m^3)	NGS % of NAAQS
NO_2	188	1-hr	--	varies[2]	112.3	--
NO_2	100	Annual	1.25	6	7.2	1%
CO	40,000	1-hr	84.4	3,664	3,748.4	0%
CO	10,000	8-hr	26.8	2,633.5	2,660.3	0%
SO_2	196	1-hr	50.1	22.5	72.6	26%
SO_2	1,300	3-hr	30.4	24.6	55.0	2%
PM_{10}	150	24-hr	1.08	44.5	45.6	1%
$PM_{2.5}$	35	24-hr	0.499	20.8[3]	21.3	1%
$PM_{2.5}$	12	Annual	0.0909	5.9[4]	6.0	1%
Lead	0.15	Quarterly	0.00002	0.01	0.0	0%

[1] NGS contributions are based on design concentration for the worst year and rank by pollutant and averaging period as follows: SO_2 1-hour: 4th high, SO_2 annual: 1st high, NO_2 1-hour: 8th high, NO_2 annual: 1st high, CO 1-hour and 8-hour: 2nd high, PM_{10} 24-hour: 6th high over 5 years, $PM_{2.5}$ 24-hour: 8th high, $PM_{2.5}$ annual: 1st high, and Lead 3-month: 1st high.
[2] NO_2 1-hour was modeled in AERMOD with seasonal, hourly background values.
[3] $PM_{2.5}$ 24-hour background includes 1.0 µg/m³ secondary aerosol formation from CAMx simulation.
[4] $PM_{2.5}$ annual background includes 0.26 µg/m³ secondary aerosol formation from CAMx simulation.
Source: Ramboll Environ (2016c).

Regional ozone monitoring data is provided in Section 3.3.4.2.1 and is representative of the cumulative impacts of NGS and other regional sources under the Proposed Action. All of the monitored ambient ozone concentrations were in compliance with the NAAQS suggesting that cumulative emissions under the Proposed Action would not result in exceedances.

3.3.5.2 HAPS

Dispersion and deposition of trace metals from NGS stacks (including mercury, selenium, and arsenic) as well as various regional and global sources, which include the Four Corners power plant, San Juan Generating Station, and non-U.S. sources, were utilized to assess cumulative impacts (EPRI 2016). The NGS contribution to the regional deposition pattern, including cumulative sources, varies by metal. The deposition of mercury has been studied in detail within the region surrounding the NGS (EPRI 2016). At locations such as Shiprock and Navajo Lake, New Mexico, the annual deposition from all sources would be 12.7 µg/m^2, and the NGS would contribute to the cumulative total between 1.7 and 2.2 percent of the annual deposition of mercury from all sources (EPRI 2016).

A similar pattern was observed at receptor points in Lake Powell and at Glen Canyon Dam, where the NGS would contribute less than 1 percent to the cumulative mercury deposition. Under the Proposed Action, the NGS would contribute negligible amounts of mercury when compared with the cumulative amounts contributed by all other sources. Further, when the NGS shuts down on or before December 22, 2019, it would stop contributing to the cumulative amount of mercury.

Mercury emissions from mining at the KM would be negligible and would not contribute to the overall cumulative impact. Under the No Action alternative, both mining and NGS operations would cease no later than December 2017; thus, there would be no contributions to cumulative mercury totals after December 2017. Deposition rates of mercury, arsenic, and selenium decline sharply over a 50-km distance from the NGS. In summary, these metals would not substantially contribute to cumulative impacts with other existing and foreseeable regional emissions sources, as NGS emissions represent only 2 to 9 percent of the total mercury deposition, and NGS deposition of selenium contributed only 0.44 percent of total selenium concentration in surface water. Deposition for these metals results primarily from other sources outside of the analysis area.

3.3.5.3 Visibility and Regional Haze

The impacts of NGS on visibility in Class I areas were modeled for the EPA BART Alterative Federal Implementation Plan and the results are discussed in Section 3.3.4.2.1. The closure of NGS in December of 2019 would meet the long-term (2060) objective of the EPA regulations to reduce visibility impacts of the facility. Existing regional visibility is discussed in Section 3.3.3.1.4 and monitoring data from regional IMPROVE network sites is provided in Appendix 3. Existing regional visibility includes the impacts of emissions from NGS and other regional sources, and is representative of the cumulative visibility impacts during continued operation.

3.4 Climate and Climate Change

This section describes the affected environment and environmental consequences for climate change in the analysis areas potentially affected by various components of the proposed Extension Lease. The analysis areas are presented first, followed by a description of the affected environment. This section concludes with environmental consequences describing the direct and indirect effects of the No Action and Proposed Action alternatives and the cumulative effects of the alternatives in combination with other sources. As summarized in Section 3.1.1, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.4.1 Regulatory Framework

Unlike criteria air pollutants, there are no NAAQS for greenhouse gases (GHGs). In its Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the CAA (FR EPA-HQ-OAR-2009-0171), EPA determined that GHGs are air pollutants subject to regulation under the CAA. GHGs' status as pollutants are due to the added long-term impacts they have on the climate because of their increased concentrations in the earth's atmosphere. Ongoing scientific research has identified that anthropogenic GHG emissions impact the global climate (IPCC 2014). Industrialization and the burning of fossil fuels have contributed to increased concentrations of GHGs in the atmosphere, including the combustion of coal and the process of coal mining. The amount of GHG emissions associated with these processes varies greatly based on mining techniques and combustion methodologies used.

EPA has promulgated rules to regulate GHG emissions and the industries responsible under the Tailoring Rule (70 FR 31514, 40 CFR Parts 51, 52, 70, 71) and the Mandatory Reporting Rule (74 FR 56260, 40 CFR Part 98). Under EPA's GHG Mandatory Reporting Rule, the NGS is required to report GHG emissions under Subparts C and D. Coal mines subject to the rule are required to report emissions in accordance with the requirements of 40 CFR Subpart FF. Subpart FF is applicable only to underground coal mines and is not applicable to surface coal mines.

EPA finalized regulations for GHG emissions from existing fossil fuel fired electric utility generating units, known as the Clean Power Plan, in 2015 (80 FR 64661). The Clean Power Plan would have established carbon emission performance limits for various state and tribal jurisdictions, including the lands of the Navajo Nation. The Supreme Court stayed implementation of the Clean Power Plan in February 2016, and more recently, EPA announced a proposed rule repealing the Clean Power Plan (82 FR 48035). The implications of this proposed rule are currently unknown.

3.4.2 Analysis Area

For the purpose of characterizing the climate of the region of the Proposed Action, the analysis area is the Colorado Plateau region of northeastern Arizona, while the analysis area for climate change is the world with a focus on the U.S. and Arizona. This is due to the long lifetimes of GHGs in the atmosphere and the global impact of climate change.

3.4.3 Affected Environment

The Colorado Plateau region in northeastern Arizona has a semiarid climate, characterized by wide variations in diurnal and annual temperature. The highest seasonal average temperatures occur in July and early August, and lowest seasonal temperatures occur in December and January. The region receives much of its precipitation during the summer months from July to October. This weather pattern is referred to as the Southwest Monsoon. Winter precipitation can occur as rain or snow, but most snowfall in the region is light and melts within a few days. Topographic features and changes in altitude influence the total amount of precipitation received at various locations.

There are three distinct climates within the Navajo and Hopi Tribal Trust Lands: the cold humid climate of the heights; the steppe climate of the mesas and high plains; and the comparatively warm desert, including the lower portions of the Chaco and Chinle Valleys and all of the southern, western, and northwestern parts of the Nation. Eight percent of the area is classified as humid, 37 percent as steppe, and 55 percent as desert.

A review of the 5-year meteorological data for 2008 through 2012 from the weather station at the Page Municipal Airport near the NGS shows that winds are generally from southwest and west (Figure 4). The average wind speed is 2.4 meters per second, and winds are calm (i.e., wind speeds are less than 0.5 meters/second) for approximately 4 percent of the observations.

An extensive climatological monitoring program has been operating within the KM lease area since the 1980s. Temperature and precipitation data recorded at site BM-MET9 from 1985 through 2013 are summarized by year in Table 14. Wind conditions at the mine are shown by the 10-meter wind rose in Figure 5 for 2006 through 2013, and prevailing winds were from the north-northeast and north for this period. The average wind speed was 3.4 meters per second, and calm conditions rarely occurred.

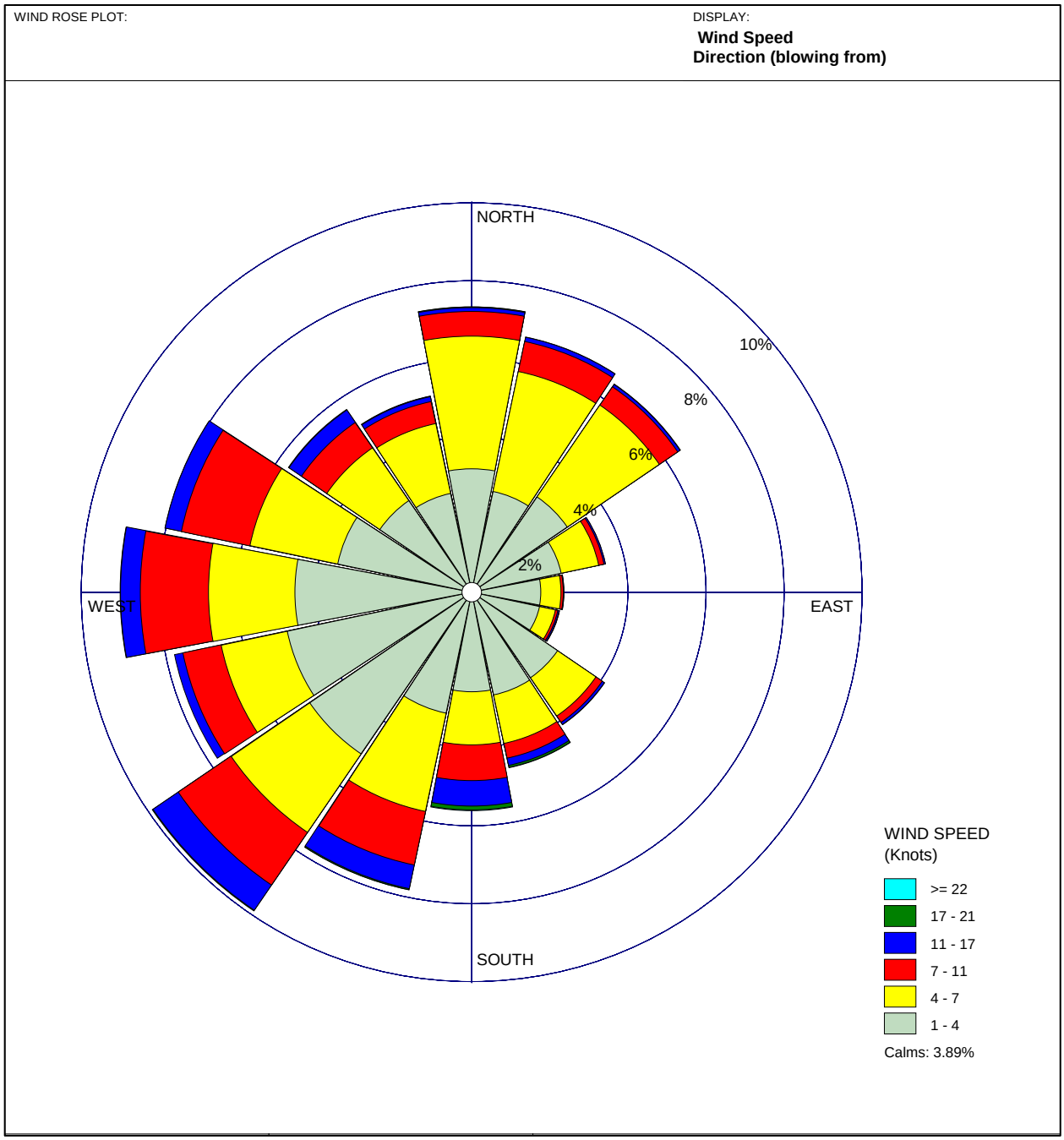

Figure 4. 10-Meter Wind Rose at Page Municipal Airport Near the NGS.

Table 14. Meteorological Data Summary for the KM from 1985 to 2013.

Year	Temperature (°F)			Precipitation (inches)
	Minimum	Maximum	Mean	
1985	-4	92	48	ND
1986	2	88	49	ND
1987	2	87	49	ND
1988	1	87	50	ND
1989	-4	93	44	ND
1990	-4	92	49	ND
1991	4	87	48	ND
1992	1	87	48	8.56
1993	5	88	49	8.40
1994	6	94	50	5.81
1995	7	91	50	8.61
1996	3	91	53	I
1997	2	85	45	I
1998	7	91	49	7.50
1999	11	92	50	6.34
2000	13	90	52	5.33
2001	6	89	51	6.78
2002	3	92	50	5.05
2003	3	95	51	8.25
2004	6	88	49	8.04
2005	6	92	50	10.31
2006	8	90	50	7.72
2007	2	92	52	8.39
2008	-3	95	50	8.51
2009	2	92	51	5.30
2010	-2	93	51	9.44
2011	-4	93	50	7.05
2012	5	91	53	7.79
2013	1	93	50	8.96
Site Record:				
Minimum	-4			5.05
Maximum	95			10.31
Mean	50			7.61

I = Incomplete year.
ND = No data.
Source: MMA 2016.

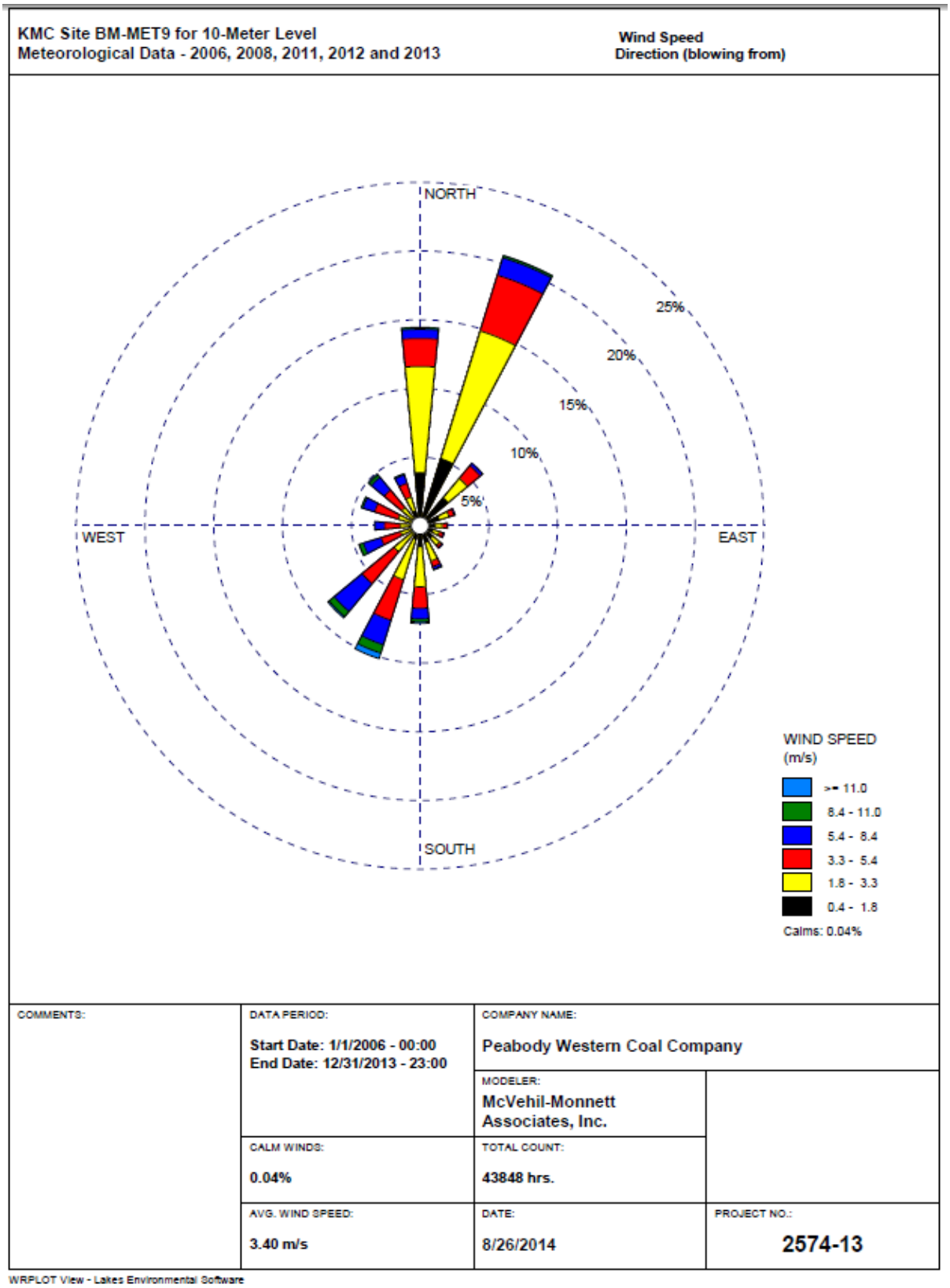

Figure 5. 10-Meter Wind Rose for the Site BM-MET9 at the KM (Source: MMA 2016).

3.4.3.1 Climate Change

The primary natural and anthropogenic GHGs in the earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and fluorinated gases. GHGs increase the retention of heat radiated from the surface of the earth by the lower atmosphere. Increasing GHG concentrations in our atmosphere impact the global climate by decreasing the amount of heat that escapes the atmosphere into space. Many GHGs are naturally occurring in the environment; however, human activity has contributed to increased concentrations of these gases in the atmosphere. Carbon dioxide is emitted from the combustion of fossil fuels (i.e., oil, natural gas, and coal), solid waste, trees, and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). Methane results from livestock and other agricultural practices and from the decay of organic waste in municipal solid waste landfills. Methane is also emitted during the production and transport of coal, natural gas, and oil. Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Fluorinated gases, while not abundant in the atmosphere, are powerful GHGs that are emitted from a variety of industrial processes and are often used as substitutes for ozone-depleting substances (e.g., chlorofluorocarbons, hydrochlorofluorocarbons, and halons).

Because carbon dioxide is the most prevalent of the regulated GHGs, EPA references the potential impact of all GHG emissions in terms of their equivalence to carbon dioxide or CO_2e. CO_2e is a quantity that describes, for a given mixture and amount of GHG, the amount of CO_2 that would have the same global warming potential (GWP), when measured over a specified timescale (generally, 100 years). CO_2e thus reflects the time-integrated radiative forcing of a quantity of emissions or rate of GHG emissions—a flow into the atmosphere—rather than the instantaneous value of the radiative forcing of the stock (concentration) of GHGs in the atmosphere. The CO_2e for a gas is obtained by multiplying the mass and the GWP of the gas. According to EPA and the reporting guidelines of the United Nations Framework Convention on Climate Change, methane and nitrous oxide have GWPs, over a 100-year time span, of 25 and 298, respectively (EPA 2017c, 2017e). This means that emissions of one million metric tons (MMT) of methane and nitrous oxide are equivalent to emissions of 25 and 298 MMT of CO_2, respectively.

3.4.3.1.1 Greenhouse Gas Emission Trends

EPA (2017e) tracks GHG emissions in the U.S. by source sector (e.g., industrial, land use, electricity generation, etc.), fuel source (e.g., coal, natural gas, geothermal, petroleum, etc.), and economic sector (e.g., residential, transportation, commercial, agriculture, etc.). The total U.S. gross GHG emissions are shown by gas in Figure 6 for 1990 to 2015. The total emissions of GHGs in 2015 were an estimated 6,587 MMT CO_2e, which is more than a 10 percent reduction relative to the peak emissions in 2007 of 7,349 MMT CO_2e. According to the World Resources Institute (WRI 2017), the U.S. contributed approximately 14 percent of the global total GHG emissions of 43,634 MMT CO_2e in 2013 (excluding land-use change and forestry).

Table 15 shows GHG emissions in MMT CO_2e by economic sector for 1990, 2005, and 2015. Table 16 presents total U.S. emissions by gas and source in CO_2e for the same years; only the largest sources are shown for each gas. Nearly 80 percent of the gross U.S. GHG emissions in 2015 were from three economic sectors: electric power industry (29.4 percent), transportation (27.4 percent), and industry (21.4 percent). Fossil fuel combustion accounted for approximately 77 percent of the U.S. total GHG emissions in 2015, and coal mining accounted for 9 percent of the total U.S. methane emissions (EPA 2017e).

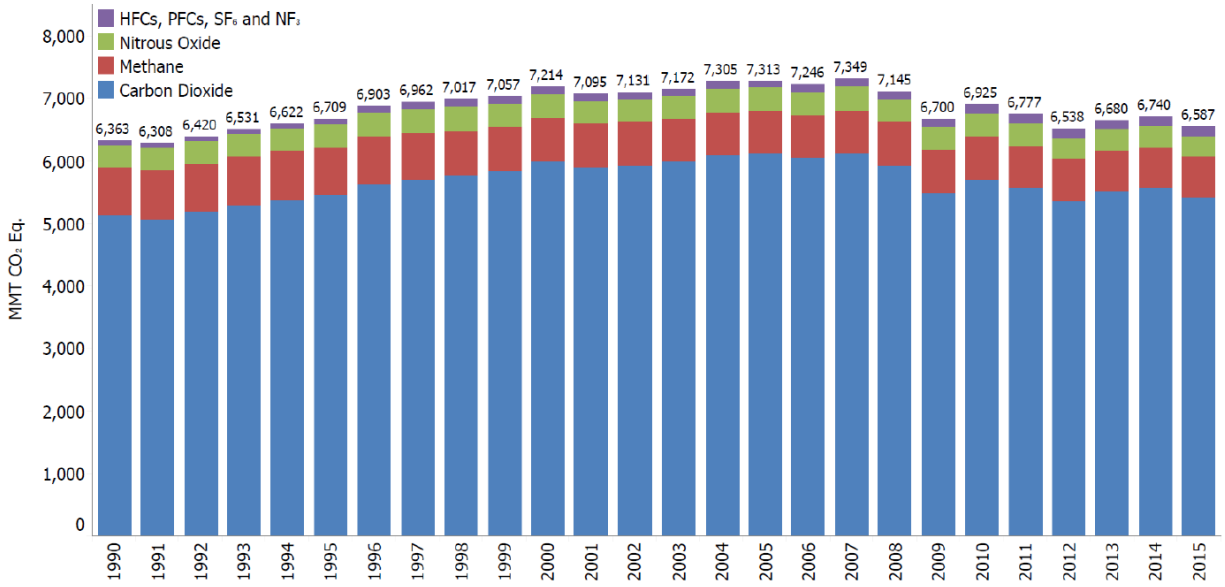

Figure 6. Gross U.S. Greenhouse Gas Emissions by Gas (Source: EPA 2017e).

Table 15. U.S. GHG Emissions Allocated to Economic Sectors (MMT CO_2e).

Economic Sectors	1990	2005	2015
Electric Power Industry	1,862.5	2,441.6	1,941.4
Transportation	1,551.2	2,001.0	1,806.6
Industry	1,626.3	1,467.1	1,411.6
Agriculture	526.7	574.3	570.3
Commercial	418.1	400.7	437.4
Residential	344.9	370.4	372.7
U.S. Territories	33.3	58.1	46.6
Total Emissions	**6,363.1**	**7,313.3**	**6,586.7**
Land Use, Land-Use Change, and Forestry (Sink)	-819.6	-731.0	-758.9
Net Emissions (Sources and Sinks)	**5,543.5**	**6,582.3**	**5,827.7**

Source: EPA 2017e.

Table 16. U.S. GHG Emissions and Sinks (MMT CO_2e).

Gas/Source	1990	2005	2015
Carbon Dioxide	**5,123.0**	**6,131.8**	**5,411.4**
Fossil Fuel Combustion	4,740.3	5,746.9	5,049.8
Non-Energy Use of Fuels	117.6	138.9	125.5
Iron and Steel Production & Metallurgical Coke Production	101.5	68.0	48.9
Natural Gas Systems	37.7	30.1	42.4
Cement Production	33.5	46.2	39.9
Methane	**780.8**	**680.9**	**655.7**
Enteric Fermentation	164.2	168.9	166.5
Natural Gas Systems	194.1	159.7	162.4
Landfills	179.6	134.3	115.7
Manure Management	37.2	56.3	66.3
Coal Mining	96.5	64.1	60.9
Nitrous Oxide	**359.5**	**361.6**	**334.8**
Agricultural Soil Management	256.6	259.8	251.3
Stationary Combustion	11.9	20.2	23.1
Manure Management	14.0	16.5	17.7
Mobile Combustion	41.2	35.7	15.1
Nitric Acid Production	12.1	11.3	11.6
HFCs, PFCs, SF6, and NF_3[1]	**99.7**	**138.4**	**184.2**
Substitution of Ozone Depleting Substances	0.3	99.7	168.5
HFC-22 Production	46.1	20.0	4.3
Electrical Transmission and Distribution	23.1	8.3	4.2
Semiconductor Manufacture	3.5	4.6	4.8
Total Emissions	**6,363.1**	**7,313.3**	**6,586.7**
Land Use, Land-Use Change, and Forestry (Sink)	-819.6	-731.0	-758.9
Net Emissions (Sources and Sinks)	**5,543.5**	**6,582.3**	**5,827.7**

[1] Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride.
Source: EPA 2017e.

In the state of Arizona, anthropogenic GHG emissions were estimated to be 105 MMT CO_2e in 2014 (including NGS), which is an increase of more than 50 percent since 1990 (WRI 2017). Arizona's GHG emissions grew at a faster rate than those of the U.S. as a whole due to rapid population and economic growth. However, Arizona's 2014 GHG emissions are 7 percent lower than the peak emissions in 2008 of 113.32 MMT CO_2e (WRI 2017). Power plants in Arizona emitted 55.4 MMT CO_2e in 2014 according to EPA's Facility Level Information on Greenhouse Gases Tool (FLIGHT, https://ghgdata.epa.gov/), or 53 percent of the state's total GHG emissions.

Secondary GHGs do not have a direct atmospheric warming effect, but they indirectly affect terrestrial radiation absorption by influencing the formation and destruction of tropospheric and stratospheric ozone, or in the case of sulfur dioxide (SO_2), the absorptive characteristics of the atmosphere. Additionally, some of these gases may react with other chemical compounds in the atmosphere to form compounds that are GHGs.

3.4.3.1.2 Observed Changes in the Climate System

Observations indicate that the global climate system is warming at unprecedented rates, and the period from 1983 to 2012 was very likely the warmest 30-year period in the last 800 years (IPCC 2014). The total increase in the average global surface temperature between 1850–1900 and 2003–2012 was approximately 1.4°F. Ocean warming accounted for more than 90 percent of the energy stored in the climate system between 1971 and 2010, and the global mean sea level rose by 0.19 meters between 1901

and 2010 (IPCC 2014). In its Fifth Assessment Report, the IPCC concludes that natural drivers cannot explain the observed warming, and that it is extremely likely that the anthropogenic increases in GHG concentrations combined with other anthropogenic forcings have been the dominant cause of the observed warming since the mid-20th century.

In the U.S., the average surface temperature increased by 1.3°F to 1.9°F between when record keeping began in 1895 and 2012 (Walsh et al. 2014). The frost-free season length, or the period between the last freeze in spring and first freeze in fall, has increased by an average of 10 days over the U.S. during the 1991 to 2012 period compared to 1901 to 1960, and the U.S. annual average precipitation has increased by approximately 5 percent over the same period.

The Assessment of Climate Change in the Southwest U.S. (Hoerling et al. 2013) summarizes a broad increase in temperatures over the U.S. Southwest. The average daily maximum temperature increased by 1.4°F from the 1901 to 2000 average to the 2001 to 2010 10-year average. It is notable that the average daily minimum temperature for the same comparison increased by 2.2°F in the Southwest, and this increase was strongest in the latter half of the period. Hoerling et al. (2013) also observed fewer cold waves and more heatwaves over the U.S. Southwest during 2001 to 2010 than during the previous century. The average frost-free season length has increased by 19 days in the Southwest during the 1991 to 2012 period compared to 1901 to 1960 (Walsh et al. 2014).

A spatial depiction of the average change in the region of the Proposed Action (and the rest of the U.S.) is provided by the Third National Climate Assessment (Walsh et al. 2014), which shows the increase in temperature for the 1991 to 2012 period compared to the 1901 to 1960 period (Figure 7). The observed temperature increase for this period over the Navajo and Hopi Tribal Trust Lands was between 1.0°F and 1.5°F, but greater than 1.5°F over most of Arizona and southern Utah.

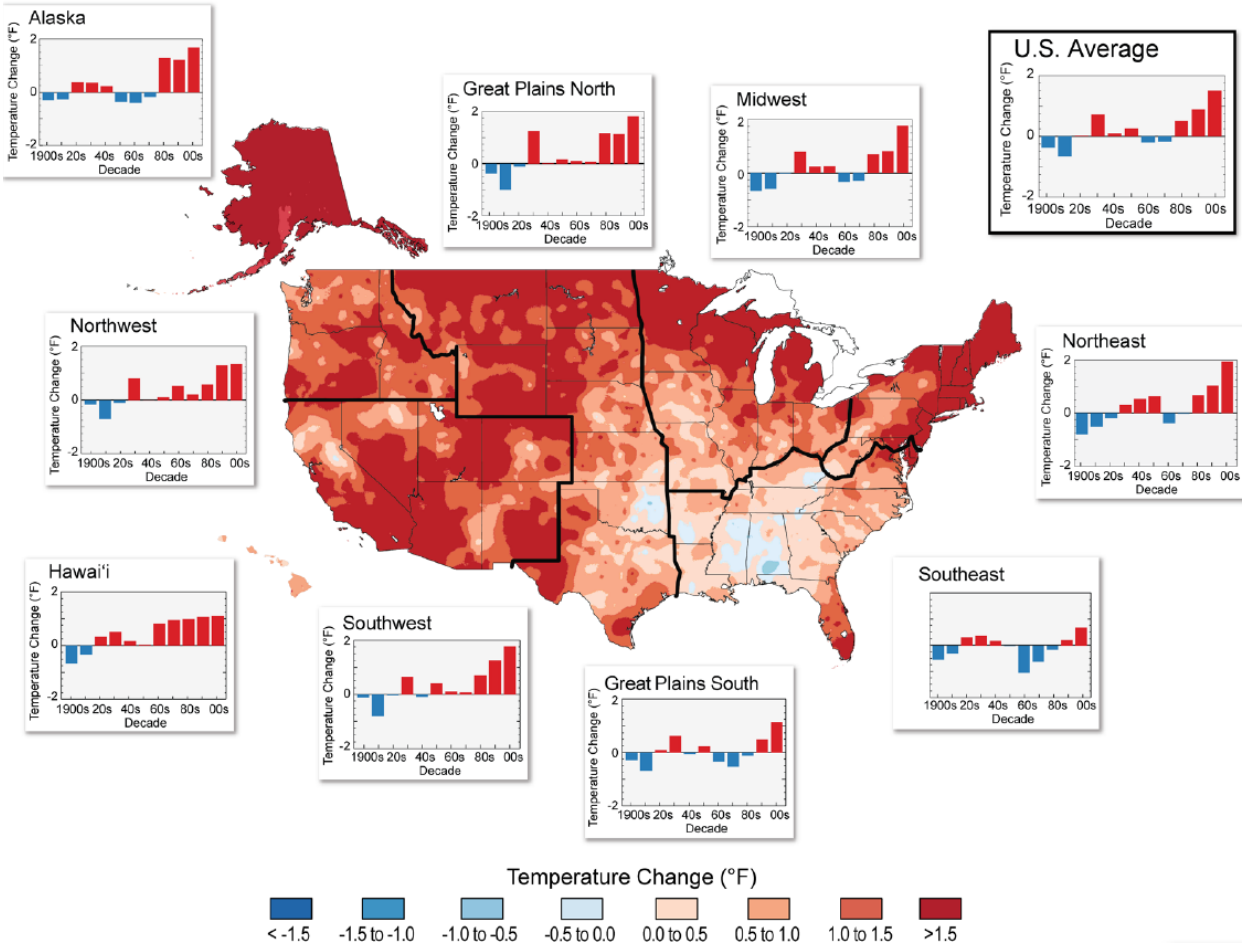

Figure 7. Temperature Changes for 1991–2012 Compared to the 1901–1960 Average (1951–1980 Average for Alaska and Hawai'i) (Source: Walsh et al. 2014).

The overall regional precipitation trends are less clear than the regional depictions of temperature changes. Both increases and decreases in precipitation have been observed in the Southwest when comparing the 1991 to 2012 annual average to the 1901 to 1960 annual average, but in northeastern Arizona a 10 percent to 15 percent reduction has been observed (Figure 8). This reduction is unique in that it is the most dramatic reduction in total annual average precipitation across the continental U.S. as well as the U.S. Southwest. However, it is difficult to quantify the fraction of this change that is attributable to human activity on a regional scale due to the large natural variability of precipitation (Walsh et al. 2014).

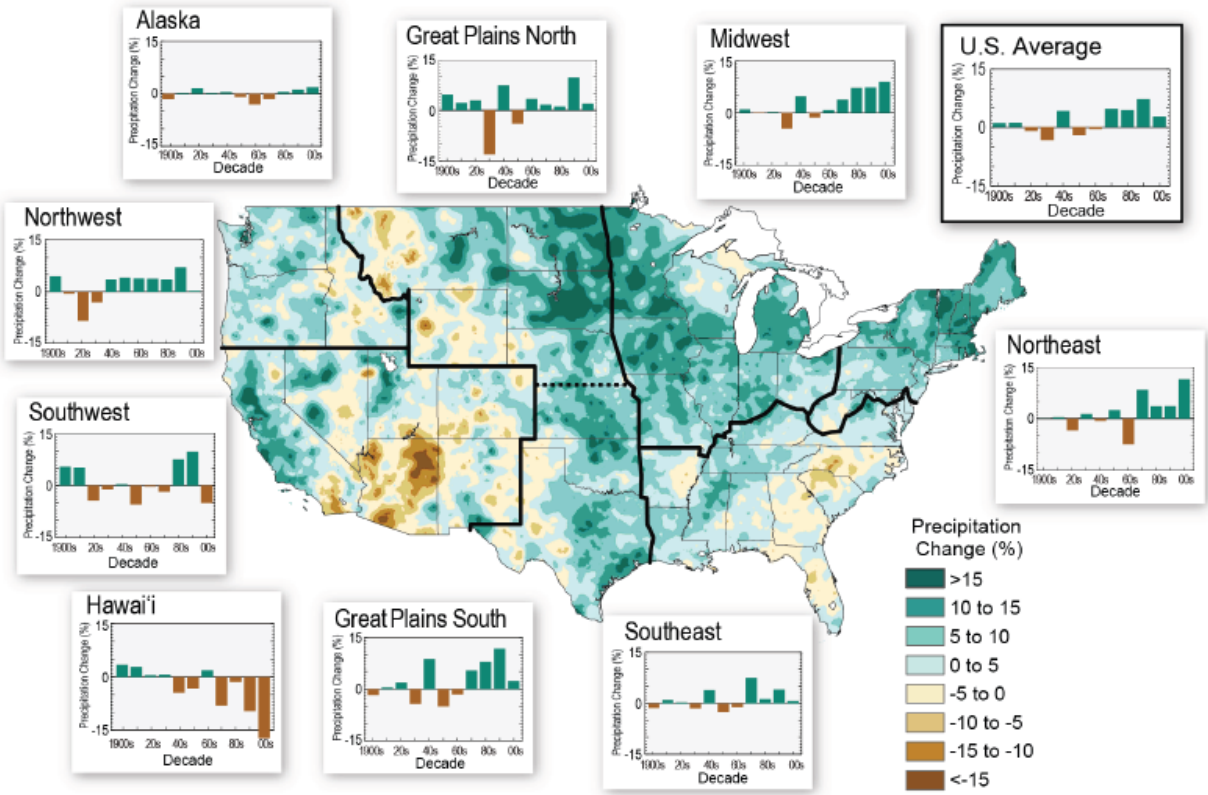

Figure 8. National Annual Precipitation Changes for 1991–2012 Compared to the 1901–1960 Average (Source: Walsh et al. 2014).

3.4.4 Environmental Consequences

This section describes the direct and indirect effects of the No Action alternative, followed by the effects of the Proposed Action, and then the cumulative effects of the Proposed Action.

3.4.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.

3.4.4.1.1 NGS and Associated Facilities

The retirement activities of the NGS and associated facilities, which are summarized in Section 2.4.1.1, include but are not limited to demolition of existing structures, buildings, and utilities (except those that the Nation requests to retain); removal or closure of ponds and landfills; surface restoration through revegetation and modification of the existing topography; and demolition and removal of the overheard catenary system, electrical distribution lines, supporting superstructure, concrete foundations, and transformers of the railroad. The railroad track and related facilities would not be removed and instead would be retained for potential future use by the Nation.

Retirement activities would require use of a variety of heavy equipment including cranes, loaders, dozers, scrapers, and excavators. Fuel usage of the heavy vehicles and equipment used in retirement activities would result in CO_2, CH_4, and N_2O emissions, and the magnitude of the GHG emissions would also depend on the number of heavy equipment required for each operation and the total hours of use. Emissions would only occur during retirement activities and would be less than emissions during active operations. The impacts of the retirement of NGS and associated facilities on climate change are expected to be negligible.

3.4.4.1.2 KM

The retirement of the KM would coincide with the closure and retirement of the NGS, as the NGS is the only market for coal from the mine. The retirement activities of the mine would follow the provisions of the approved mine permit application package and SMCRA regulations (OSMRE 2017, 2017b). Upon shutdown of the mine on or before December 22, 2019, heavy equipment use for reclamation operations would continue to contribute to GHG emissions until PWCC's reclamation obligations are met. GHG emissions of CO_2, CH_4, and N_2O would result from the fuel usage of heavy equipment during retirement operations; retirement emission impacts on climate change are expected to be negligible.

3.4.4.1.3 STS and WTS on Navajo Tribal Trust Lands

Under the No Action alternative, it is likely the NGS Lessees would enter into negotiations with the Nation to ensure continued operation and maintenance of the STS and WTS as they have been historically. Potential GHG emissions from the continued operation and maintenance of these systems are discussed under the Proposed Action in Section 3.4.4.2.3. In the unlikely event that arrangements cannot be agreed upon regarding the continued operation and maintenance of the STS and WTS, retirement of the portions of the STS and WTS on Navajo Tribal Trust Lands would be completed by the end of December 2019. Emissions would only occur during the retirement activities, described in Section 2.3.3.3, and the impacts on climate change are expected to be negligible.

3.4.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. GHGs from the Proposed Action are too small to allow calculation of any measurable change on global climate. However, GHG emissions from the Proposed Action are provided and discussed in the context of Arizona, U.S., and global anthropogenic GHG emissions. Climate change is considered a cumulative impact on affected resources where relevant and appropriate. The effects of climate change on the project are not discussed because the short time frame of the Proposed Action would make these impacts inconsequential.

3.4.4.2.1 NGS and Associated Facilities

GHG emissions from the continued operation of the NGS through December 22, 2019, under the Proposed Action would primarily be related to the combustion of coal at the NGS, and this is directly related to the level of power production. An estimate of GHG emissions from NGS operations in Table 17 is provided based on estimates of fuel use and oil combustion. The estimates are based on an annual 88 percent capacity factor and use the following assumed conversion factors (from 40 CFR Part 98 Tables C-1 and C-2, and Subpart A), and the heat rate data provided by the NGS:

- 93.28 kg carbon dioxide per million British thermal units (BTU) of coal combustion.
- 0.011 kg methane per million BTU of coal combustion, CO_2e weight of 25.

- 0.0016 kg nitrous oxide per million BTU of coal combustion, CO_2e weight of 298.
- Gross NGS heat rate of 11,194 BTU/kilowatt-hour, or 11.194 million BTU/megawatt-hour.

Table 17. NGS CO_2 and Total GHG Emissions.

Source	Emissions (MMT CO_2e/year)[1]
CO_2 Emissions	
NGS generation	18.111
NGS support operations	0.129
Total (rounded)	18.240
Total GHG Emissions	
NGS generation	18.257
NGS support operations	0.130
Total (rounded)	18.387

[1] Based on NGS generation of 1,980 MW, 88 percent capacity factor.
MMT = million metric tons.

The BM&LP Railroad is an electric train that delivers coal from the KM to the NGS, and it would continue to operate as it has historically until retirement activities begin. The electric power required to operate the railroad is provided by the NGS, and thus the GHG emissions associated with its operation are accounted for in the NGS emissions provided in Table 17. Therefore, the only source of GHG emissions not already accounted for from the railroad would be routine and emergency maintenance operations, and these emissions would be minimal and have a negligible effect on the total GHG emissions from the Proposed Action.

The annual estimated GHG emissions from the NGS would comprise approximately 0.04 percent, 0.28 percent, and 17.5 percent of the total global, U.S., and Arizona GHG emissions, respectively, during the 2 years of continued operation. While the continued operation of the NGS would contribute incrementally to climate change, predicting the degree of impact that any single emitter of GHGs may have on global climate change, or on the changes to biotic and abiotic systems that accompany climate change, is not possible at this time. No tools or scientifically defensible analysis methods exist to describe the degree to which any observable changes can or would be attributable to the Proposed Action. As such, the extent of impact that emissions resulting from continued operation of the NGS may have on global climate change, as well as the accompanying changes to natural systems, cannot be accurately quantified (US GCRP 2009). NGS operation under the Proposed Action involving 2 years of operation would have no measurable impact on the climate and would be negligible.[25]

3.4.4.2.2 KM

The KM provides all of the coal used at the NGS, and these operations would continue as they have historically under the Proposed Action until the NGS is shut down. The GHG emissions that would be produced during the continued operation of the mine are considered indirect effects of the Proposed

[25] To provide additional context, EPA modeled global climate change impacts from a model source emitting 20 percent more GHGs than a 1,500-MW coal-fired steam electric generating plant (14,132,586 metric tons per year of carbon dioxide, 273.6 metric tons per year of nitrous oxide, and 136.8 metric tons per year of methane). The model included an estimate of a hypothetical maximum mean global temperature value increase resulting from such a project. The results ranged from 0.00022°C to 0.00035°C occurring after approximately 50 years of facility operation. The modeled changes are extremely small, and any downsizing of these results from the global scale would produce greater uncertainty in the predictions. EPA concluded that even assuming such an increase in temperature could be downscaled to a particular location, it "would be too small to physically measure or detect" (Meyers, pers. comm. 2008). The emissions from the NGS under the Proposed Action would be a fraction of EPA's modeled source.

Action. GHG emissions sources from mining are in two main categories: methane released by the exposure of the coal seams to the atmosphere and combustion emissions from mining equipment. The combustion emission component includes gaseous emissions and particulate emissions (black carbon).

Kirchgessner et al. (2000) estimated methane content from coal mined from western surface coal mines at 0.17 pound per ton of coal. Given the approximate annual coal production rate of 7,900,000 tons of coal (OSMRE 2017), the total methane that would be released during mining, handling, storage, and processing of coal is estimated to be 671.5 tons per year. With methane's global warming potential of 25, this equates to 16,788 tons of CO_2e (15,230 metric tons CO2e).

Fuel use for mining operations, including diesel-fired mining equipment, vehicle traffic, and hauling operations during the Proposed Action, is based on an estimated 7.66 million gallons of diesel fuel for the operating equipment at 7.9 million tons per year of coal production. That analysis uses diesel fuel emissions data from 40 CFR Part 98 Tables C-1 and C-2, and an assumed sulfur content of 15 ppm by volume along with the projected equipment SO_2 emissions for proposed mine operations.

Table 18 provides annual GHG emissions from the KM during the continued operations under the Proposed Action. The level of annual production was calculated to meet the expected power generation levels at the NGS. The estimated annual GHG emissions from the mine comprise 0.0002 percent, 0.0014 percent, and 0.089 percent of global, U.S., and Arizona GHG emissions. As the GHG emissions from the KM are much less than those from NGS, the continued operation of the KM would also have no measurable impact on climate and would be negligible.

Table 18. GHG Annual Emissions from KM Operations under the Proposed Action.

Annual Coal Production (tons/year)	Methane Emissions	Equipment Emissions	Total Emissions
	(MMT CO_2e/year)		
7,900,000	0.015230	0.078415	0.093645

MMT = million metric tons.
Source: OSMRE 2017.

3.4.4.2.3 STS and WTS on Navajo Tribal Trust Lands

Under the Proposed Action, the operation and maintenance of the STS, WTS, and communication sites would continue for 35 years until the end of the Extension Lease term in 2054. Except for the GHG emissions from maintenance operations and incidences of on-site emergency power generation at communication sites, there would be no other GHG emissions associated with the continued operation and maintenance. The GHG emissions generated during future operation and maintenance of the transmission system would be less than 10 metric tons per year CO_2e and thus would have a negligible effect on total GHG emissions from the Proposed Action. The effects of natural variability in climate conditions would be greater than any projected change in climate conditions related to these operations. Retirement of the STS and WTS on Navajo Tribal Trust Lands is discussed in Section 3.4.4.1.3.

3.4.4.2.4 Retirement of the NGS, KM, and STS and WTS

Emissions of GHGs during retirement activities for the NGS and the KM under the Proposed Action would be comparable to those under the No Action alternative that are discussed in Section 3.4.4.1, but would occur over a 5-year period.

Retirement of the STS and WTS on Navajo Nation Tribal Trust Lands would occur either over a 2-year period at the end of the Extension Lease term in 2054, or after an additional 35 years of operation. Emissions of GHGs from the retirement of the transmission systems and communication sites would be similar to those under the No Action alternative.

3.4.5 Cumulative Effects

Climate change by nature is a cumulative process to which sources contribute GHGs from around the globe. The values detailed in Table 19 represent the total GHG emissions under the continued operation of the NGS and the KM under the Proposed Action.

Table 19. Total Annual GHG Emissions from the Proposed Action.

GHG Source	CO_2e (MMT/year)
Mine equipment combustion	0.078
Mine methane release from coal	0.015
NGS combustion	18.387
Total	**18.481**

MMT = million metric tons.

Table 20 provides GHG emissions from 2015 for power plants in southern Utah, northern Arizona, and the northwestern corner of New Mexico (San Juan County). GHG emissions from the Proposed Action would be the largest in the region but would be short-term and only occur for the 2 years of operation. Table 21 compares the calculated GHG emissions from the Proposed Action to national and global totals. This shows that the contribution of the Proposed Action from the continued operation of the NGS and the KM would contribute negligibly to the total cumulative U.S. and global GHG emissions, as well as to the cumulative impact on climate change, because of their comparatively small emissions and short duration of contribution under the Proposed Action. The GHGs from transmission systems would have a negligible effect on total GHG emissions from the Proposed Action and therefore would constitute a negligible fraction of the total cumulative U.S. and global GHG emissions.

Table 20. Major Regional Power Plant GHG Emissions.

Facility	2015 Emissions (MMT CO_2e/year)
Intermountain Power Service Corporation: Intermountain Generation Station	10.850
San Juan Generating Station[1]	9.921
Tucson Electric Power Company – Springerville	9.818
Pacificorp: Hunter Power Plant	9.405
Four Corners Power Plant	9.226
Arizona Public Service Company – Cholla Power Plant	6.246
Pacificorp: Huntington Power Plant	5.606
Coronado Generating Plant	5.572
Graymont Western US Incorporated: Cricket Mountain Plant	0.863
Sunnyside Cogeneration Associates: Sunnyside Cogeneration Facility	0.551
Pacificorp: Carbon Power Plant	0.413
Novo Biopower, LLC	0.110

[1] Two units at San Juan Generating Station are scheduled to be decommissioned at the end of 2017.
Source: EPA FLIGHT (https://ghgdata.epa.gov/).

Table 21. Comparison of Annual GHG Emissions from the Proposed Action to U.S. and Global GHG Emissions.

GHG Source and Percent Comparison	CO_2e (MMT/yr)
Total U.S. GHG Emissions (2014)[1]	6,586.70
NGS plus KM: percent of nationwide total	0.28 percent
Total GHG Global (2013)[2]	43,634.28
NGS plus KM: percent of global total	0.04 percent

[1] Source: EPA 2017e.
[2] Excludes land-use change and forestry.
Source: WRI 2017.

Various climate models have provided a wide range of predictions of global surface air temperature over the next decade. The IPCC (2013) report summarizes details of temperature and precipitation changes resulting from an array of global and regional atmospheric circulation models. A consensus was built around the results of multiple models that were run with a range of predicted increases in CO_2 emissions. While the Arctic region is predicted to receive the greatest increase in annual temperature, the western and southwestern portions of the U.S. also are regions where predicted increases in temperature are notable (Figure 9). Northern Arizona may experience up to 2°C annual average increase by mid-century under the low global emissions scenario and potentially up to 4°C under the high global emissions scenario (IPCC 2013). Based on a summary of model impacts (Cayan et al. 2013) as demonstrated for the different emissions scenarios in Figure 9, regional temperature increases could range from 2°C to approximately 5°C by the late 21st century.

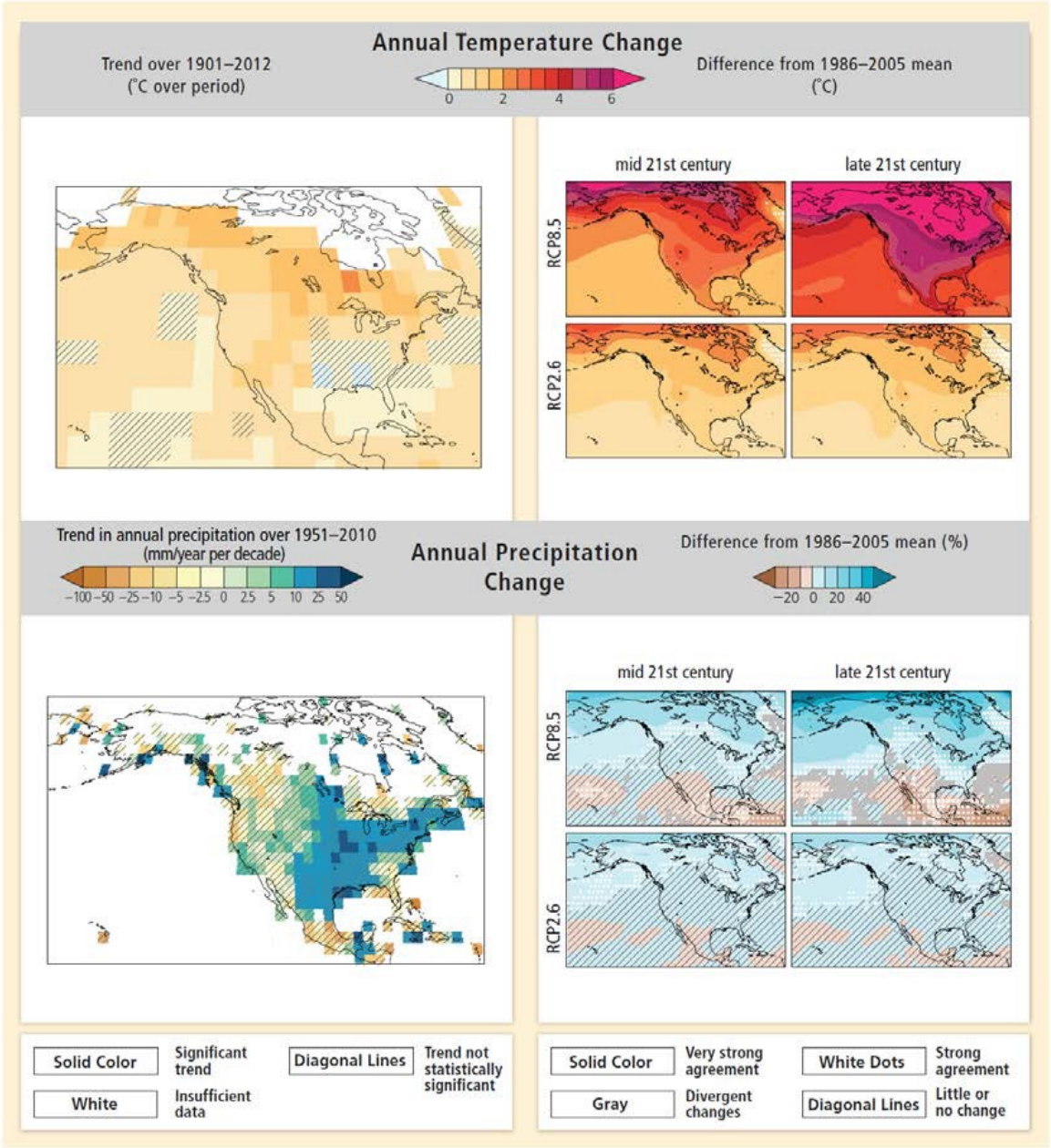

Figure 26-3 | Observed and projected changes in annual average temperature and precipitation. (Top panel, left) Map of observed annual average temperature change from 1901–2012, derived from a linear trend. [WGI AR5 Figures SPM.1 and 2.21] (Bottom panel, left) Map of observed annual precipitation change from 1951–2010, derived from a linear trend. [WGI AR5 Figures SPM.2 and 2.29] For observed temperature and precipitation, trends have been calculated where sufficient data permit a robust estimate (i.e., only for grid boxes with greater than 70% complete records and more than 20% data availability in the first and last 10% of the time period). Other areas are white. Solid colors indicate areas where trends are significant at the 10% level. Diagonal lines indicate areas where trends are not significant. (Top and bottom panel, right) CMIP5 multi-model mean projections of annual average temperature changes and average percent changes in annual mean precipitation for 2046–2065 and 2081–2100 under RCP2.6 and 8.5, relative to 1986–2005. Solid colors indicate areas with very strong agreement, where the multi-model mean change is greater than twice the baseline variability (natural internal variability in 20-yr means) and ≥90% of models agree on sign of change. Colors with white dots indicate areas with strong agreement, where ≥66% of models show change greater than the baseline variability and ≥66% of models agree on sign of change. Gray indicates areas with divergent changes, where ≥66% of models show change greater than the baseline variability, but <66% agree on sign of change. Colors with diagonal lines indicate areas with little or no change, where <66% of models show change greater than the baseline variability, although there may be significant change at shorter timescales such as seasons, months, or days. Analysis uses model data and methods building from WGI AR5 Figure SPM.8. See also Annex I of WGI AR5. [Boxes 21-2 and CC-RC]

Figure 9. Changes in Annual Average Temperature and Precipitation (IPCC 2013, Figure 26-3).

Global warming of approximately 2°C (3.6°F) above the pre-industrial baseline would very likely lead to more frequent extreme heat events and daily precipitation extremes over most areas of North America,

more frequent low snow years, and shifts towards earlier snowmelt runoff over much of the western U.S. and Canada (IPCC 2013). Together with climate hazards such as higher sea levels and associated storm surges, more intense droughts, and increased precipitation variability, these changes are projected to lead to increased stresses to water, agriculture, economic activities, and urban and rural settlements. Global warming of approximately 4°C (7.2°F) would very likely cause larger changes in extreme heat events, daily scale precipitation extremes, and snow accumulation and runoff.

The observed and predicted increase in surface temperatures also would have an effect on the length of the local growing season. Cayan et al. (2013) predict that the average growing season length would increase by 24 to 31 days per year for the period 2041 to 2070 when compared to 1971–2000. This projection would result in an ongoing trend in the increase in the length of the growing season by approximately 1 day every 3 years. The effect may differ within the different climate areas, even within the Navajo and Hopi Tribal Trust Lands, but there is confidence that the length of the growing season likely would increase.

Predicted change in regional precipitation is less clear than for regional temperatures for the 21st century. The Proposed Action is in a region where the model predictions are not clear and are not statistically significant, as shown in Figure 9. Northern Arizona is in the area where a near-zero change in annual precipitation is predicted. For higher emissions, the models predict a slight (0 to 10 percent) increase in annual precipitation in the region; however, that increase is determined to be not significant (IPCC 2013). The IPCC panel indicates low confidence in determining a trend in precipitation that is associated with changing climate. Any trend in precipitation is generally very small in comparison to the variability in the historical record and in comparison to the variability among the model results (Cayan et al. 2013).

Over the U.S. Southwest, the prediction related to the primary seasonal precipitation features is less clear. Most models predict an increase in winter precipitation (i.e., December, January, and February) with a slight tendency for reduced precipitation in other seasons (Cayan et al. 2013). However, the precipitation pattern includes a projection of more rainfall and less snow, resulting in lower spring snowpack levels, earlier snowmelt, and a reduction in late-spring and summer runoff from mountainous areas. Projected Colorado River flows are expected to show possible reduction from climate change impacts ranging from approximately −5 percent to −20 percent of the current annual flow by mid-century.

EPA (2016b) has predicted that Arizona will experience the following general trends related to climate change:

- The region will experience warmer temperatures with less snowfall and decreased snowpack.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt will result in earlier peak stream flows, weeks before the peak needs of ranchers, farmers, recreationalists, and others. In late summer, rivers, lakes, and reservoirs will be drier.
- More frequent, more severe, and possibly longer-lasting droughts will occur.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions will reduce the range and health of ponderosa and lodgepole pine forests and increase the susceptibility to fire.
- Grasslands and rangelands could expand into previously forested areas.
- Ecosystems and wildlife will be stressed.

As explained above, climate change can contribute to changes in resources of local and regional significance, such as surface water quantity and discharge timing, wildlife and livestock forage

availability, and fish habitat. However, these local and regional effects cannot be accurately quantified due to the limitations in current climate change models, the complexity of ecosystems, and the effects of natural climate variability over a time frame as short as the Proposed Action for retirement actions. Further, the Proposed Action, including transmission operations, would have a negligible contribution to cumulative effects on climate change and would not contribute cumulatively to climate change effects on local and regional resources.

3.4.5.1 Social Cost of Carbon

In addition to the cumulative effects of climate change on various resources discussed above, several of the social costs of NGS carbon emissions for 2 years of operation are also addressed in other sections of this EA including Air Quality (Section 3.3) and Public Health and Safety (Section 3.13). Another approach to analyzing possible climate change impacts is to calculate what is commonly known as the social cost of carbon. The social cost of carbon protocol was developed by a federal Interagency Working Group (IWG) to assist agencies in addressing EO 12866, which required federal agencies to assess the cost and the benefits of intended regulations as part of their regulatory impact analyses. The social cost of carbon protocol estimates economic damages associated with increases in carbon emissions and includes, but is not limited to, changes in net agricultural productivity, human health, and property damages associated with increased flood risks over hundreds of years. The estimates are developed by aggregating results "across models, over time, across regions and impact categories, and across 150,000 scenarios" (Rose et al. 2014). However, a recent EO titled, "Promoting Energy Independence and Economic Growth," issued March 28, 2017, directed that the IWG be disbanded and that technical documents issued by the IWG be withdrawn as no longer representing federal policy (Section 5). It further directed that when monetizing the value of changes in GHG emissions resulting from regulations, agencies follow the guidance contained in Office of Management and Budget Circular A-4 of September 17, 2003.

The social cost of carbon is typically expressed as the cost in dollars per metric ton (MT) of emissions and there is a wide range of costs, with the greatest influence on costs caused by the discount rate. The discount rate is a measure to estimate the present value for costs/damages that may occur far out into the future. However, there is a lack of consensus on the appropriate discount rate, which leads to substantial variation in output. In other words, small differences in the discount rate can create large variations to the estimated social cost of carbon.

In addition, as discussed in the comprehensive technical review commissioned by the Electric Power Research Institute (EPRI) (Rose et al. 2014), a number of fundamental technical issues have been identified with the social cost of carbon modeling approach and estimates. Several of these issues arise from the use of three separate underlying models – with differing frameworks, assumptions, and uncertainties. The EPRI technical review "reveals significant variation across models in their structure, behavior, and results and identifies fundamental issues and opportunities for improvements" (Rose et al. 2014).

It should also be noted the social cost of carbon protocol does not measure the actual incremental impacts of a project on the environment and does not include all damages or benefits from carbon emissions. NEPA does not require a cost-benefit analysis (40 CFR Part 1502.23) and one has not been conducted. Without a complete monetary cost-benefit analysis, which would include the social benefits of energy production to society as a whole and other potential positive effects, inclusion of a global social cost of carbon analysis would be unbalanced, potentially inaccurate, and not useful. Given the uncertainties associated with assigning a specific and accurate social cost of carbon resulting from 2 years of operation under the Extension Lease, and that the models were developed to estimate impact over long time frames, this EA quantifies direct and indirect GHG emissions and evaluates these emissions in the context of global, U.S., and Arizona GHG emission inventories as discussed in Section 3.4.3.1.1. Based on Section

3.4.4.2, Table 22 provides the percentage of annual GHG emissions for each project component under the Proposed Action in relation to each geographic scale of total emissions.

Table 22. Percentage of GHG Annual Emissions under the Proposed Action to Global, U.S., and Arizona Totals.

Component	Percentage of Global	Percentage of U.S.	Percentage of Arizona
NGS and Associated Facilities	0.04	0.28	17.5
KM	0.0002	0.0014	0.089
STS and WTS	negligible	negligible	negligible
Total	0.04	0.28	17.6

Consequently, the increased economic activity, discussed in terms of revenue, employment, labor income, total value added, and output are simply the economic impacts associated with the Proposed Action. Economic impact is distinct from “economic benefit” as defined in economic theory and methodology, and the socioeconomic impact analysis required under NEPA is distinct from cost-benefit analysis.

To summarize, Reclamation is not undertaking an analysis of the social cost of carbon in this EA because (1) it is not engaged in a rulemaking for which the protocol was originally developed; (2) the IWG, technical supporting documents, and associated guidance have been withdrawn; (3) NEPA does not require cost-benefit analysis and the agency did not undertake one here; and (4) the full social benefits of coal-fired energy production have not been monetized and thus, quantifying only the costs of GHG emissions would provide information that is both potentially inaccurate and not useful.

3.5 Geological, Mineral, and Paleontological Resources

This section describes the affected environment and environmental consequences for geological, mineral, and paleontological resources in the analysis area. As summarized in Section 3.1.1, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.5.1 Regulatory Framework

Regulations dealing with geological resources and extraction of mineral resources include the SMCRA, Mineral Leasing Act, and Federal Coal Leasing Amendments Act. The federal laws that protect paleontological resources on public lands, including the Antiquities Act and the Paleontological Resources Preservation Act, do not apply to tribal lands.

3.5.2 Analysis Area

The analysis area for geological, mineral, and paleontological resources is the NGS and associated facilities, the KM, and the STS and WTS on Navajo Tribal Trust Lands.

3.5.3 Affected Environment

The analysis area is located within the southwestern region of the Colorado Plateau physiographic province, which is characterized by relatively flat-lying and laterally continuous Paleozoic and Mesozoic sedimentary formations that have been sculpted by erosion to form mesas and plateaus. The two prominent features within the Colorado Plateau physiographic province are the Kaibito Plateau, in which the NGS is located, and Black Mesa, in which the KM is located and which is part of the Black Mesa Basin. The Black Mesa Basin abuts the Kaibito Plateau to the east. The Kaibito Plateau is a low-relief feature that extends from the Page, Arizona area to Black Mesa. Black Mesa is higher in elevation than the surrounding areas of Arizona.

3.5.3.1 NGS and Associated Facilities

The NGS is located on the northern end of the Kaibito Plateau. Bedrock exposed at the site or in the vicinity of the site includes, in ascending age, the Navajo Sandstone, the Page Sandstone, and the Carmel Formation (Allis et al. 2003; Billingsley and Priest 2013). The stratigraphy of these formations is shown in Figure 12 in Section 3.8, Water Resources. The Navajo Sandstone is a fine- to medium-grained quartz sandstone, Lower Jurassic in age, and is the uppermost formation of the Glen Canyon Group. The Navajo Sandstone was derived from wind-driven sand and is known for its characteristics as a prominent cliff former, large-scale cross bedding, and pale red and white sandstone. The Navajo Sandstone is reported to be 1,400 feet thick in the NGS facility area and is the principal water-bearing unit in the area (Billingsley and Priest 2013). The lake pump facility, the road between Navajo Nation Route 22B and the lake pump facility, and portions of the water pipeline and the 230-kV electrical transmission line from the lake pump facility to the NGS are located on the Navajo Sandstone.

The Page Sandstone is Middle Jurassic in age and is the lowest formation of the San Rafael Group. It was considered part of the Navajo Sandstone, which it looks very similar to, until it was determined that the units are separated by a major regional Jurassic unconformity and that deposition was not continuous from the Navajo Sandstone to the Page Sandstone (Peterson and Pipiringos 1979). The Page Sandstone varies in thickness from 125 to 250 feet in the vicinity of the NGS (Pipiringos and O'Sullivan 1978). The ash (CCR) disposal area, portions of the water pipeline, and portions of the 230-kV electrical transmission line from the lake pump facility to the NGS are located on the Page Sandstone (Billingsley and Priest 2013).

The Carmel Formation is Middle Jurassic in age and is the middle formation of the San Rafael Group. It is composed of siltstone, claystone, and silty calcareous and gypsiferous sandstone (Billingsley and Priest 2013; Wanek and Stephens 1953). It is distinguished from the Navajo and Page Sandstones by its reddish-brown color. The Page Sandstone and Carmel Formation are erosional remnants that form benches on the Navajo Sandstone. The Carmel Formation is reported to be about 70 feet thick in the vicinity of the NGS (SRP 2017d). The NGS plant and the coal unloading and storage facilities are underlain by the Carmel Formation.

A few faults mapped in exposed bedrock trend either northwest to southeast or northeast to southwest. No Quaternary or potentially active faults have been identified in the Kaibito Plateau (U.S. Geological Survey [USGS] and Arizona Geological Survey 2006).

From the NGS plant, the BM&LP Railroad heads southeast on its way to the KM. The route is initially underlain by the Navajo Sandstone and then changes to the Carmel Formation. The railroad then crosses the Klethia Valley, which is the location of the Cow Creek Syncline, a trough fold that separates Black Mesa from the plateaus to the northwest (Nations et al. 2000; Trapp and Reynolds 1995). The train route through the Klethia Valley crosses unconsolidated sand dune deposits and bedrock of the San Raphael and Glen Canyon Groups (Haynes and Hackman 1978). The railroad then turns to the northeast and crosses onto the Black Mesa Basin and terminates near the KM.

3.5.3.2 KM

The following information is summarized from the KM EA (OSMRE 2017). The KM is located in the northern portion of the Black Mesa Basin and contains coal-bearing rocks. Relatively flat-lying Precambrian to Holocene-aged sedimentary rocks dominate the geology of the KM with minor structural deformation by local folding and faulting. The Mesa Verde Group is the uppermost lithologic unit in the mine area and includes, in ascending age, the Toreva Formation, the Wepo Formation, and the Yale Point Sandstone. The Toreva Formation, the Wepo Formation, and the Yale Point Sandstone are all Upper Cretaceous in age.

The Toreva Formation is a fossiliferous sandstone.

The Wepo Formation consists of coal, carbonaceous siltstone, mudstone, and sandstone and contains the coal mined at the KM. The Wepo Formation coal is the most economically viable to mine of the coals that occur in the analysis area because the seams are generally thicker, have the highest quality, and are the most mineable reserves (Nations et al. 2000).

The Yale Point Sandstone is a medium- to coarse-grained quartz sandstone and is interbedded with the underlying Wepo Formation.

The Black Mesa Basin is a broad synformal geologic structure defined by major uplifts (e.g., Defiance Uplift) and regionally important monoclines (e.g., Organ Rock Monocline). These large geologic structures control the regional attitudes of the rock formations and affect the types of landforms developed (Cooley et al. 1969). Normal faulting associated with fold axes is the most common landform type. Most faults are oriented east to west and are displaced less than 40 feet. None of these faults are considered active.

3.5.3.3 STS and WTS on Navajo Tribal Trust Lands

The STS and WTS on Navajo Tribal Trust Lands are in the Colorado Plateau. The geologic environment underlying the STS and WTS near the NGS is the same as that discussed above for the NGS. Along the STS about 40 miles south of the NGS facility, the underlying geology transitions to the Chinle Formation and minor Holocene-age surface sediment deposits. The Chinle Formation is Upper Jurassic in age and

consists of coarse- to fine-grained sedimentary rocks of sandstone, siltstone, mudstone, and limestone. About 70 miles south of the NGS facility, the underlying geology transitions to Lower- to Middle-Triassic-age sedimentary rocks and then to Permian-age sedimentary rocks prior to the STS leaving Navajo Tribal Trust Lands.

3.5.3.4 Mineral Resources

The primary mineral resource in the analysis area is coal on Black Mesa. No other important mineral resources have been documented on Black Mesa or in the NGS or STS and WTS corridors. Of the mine-leased reserves of 670 million tons of coal, approximately 455 million tons have been mined through 2014 (OSMRE 2017). Mining is within the economically viable coal reserves of the Wepo Formation. The USGS's inferred total coal resource in the Wepo Formation exceeds 4.8 billion tons (Nations et al. 2000).

The Mancos Shale, which underlies the Toreva Formation, has the potential to yield oil and gas. The potential for hydrocarbon production from the Mancos Shale at Black Mesa is unknown because there are no geochemical analyses for total organic carbon content or wells drilled to specifically test the shale (Rauzi 2015; Rauzi and Spencer 2013).

When rocks adjacent to burning coal seams are baked and subjected to thermal metamorphism, scoria is formed. The scoria is quarried for road maintenance aggregate and placement in portions of the mined and reclaimed areas to promote medicinal and traditional plant growth (OSMRE 2011b).

Along the STS corridor, the system crosses the former Cameron uranium mining area about 40 miles south of the NGS facility along U.S. Highway 89 where uranium ore was mined from the Chinle, Kayenta, and Moenkopi Formations. The mining occurred from 1950 to 1963. In 2005 the Nation passed a moratorium on future uranium mining on its land.

3.5.3.5 Paleontological Resources

Paleontological resources (fossils) are the remains, imprints, and traces of once-living organisms preserved in rock layers. Fossils are nonrenewable resources with scientific, educational, commercial, and recreational (fossil hunting) values. The STS, WTS, and NGS and associated facilities are underlain by Jurassic to Permian-age formations that have low to medium fossil potential. Within the KM area, the Cretaceous coal-bearing strata in the analysis area contain abundant plant and animal fossils and have high potential for yielding fossils.

3.5.4 Environmental Consequences

This section describes the direct and indirect effects of the No Action alternative, followed by the effects of the Proposed Action, and then the cumulative effects of the Proposed Action.

3.5.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would be retired by the end of 2019.

3.5.4.1.1 NGS and Associated Facilities

During and following retirement activities, direct impacts would be short-term and negligible for geologic strata, landforms, topography, and mineral resources. This is because operations would cease, and certain NGS facilities and the catenary portion of the railroad line would be removed and reclaimed as described in Section 2.4. There is limited potential for disturbance of new ground because ground disturbance within the existing footprint of the leased lands and ROWs is likely to occur in areas that have already

been disturbed. Areas of new disturbance (e.g., new solid waste landfill) would occur within the existing footprints of the leased lands and would be small. If a new solid waste disposal area was created in the ash (CCR) disposal area, geologic strata may be affected in the short term to create the disposal area. The exact size of the new solid waste landfill would depend on how much waste was generated in excess of the amount that could be stored in the current landfill. Impacts on paleontological resources would be negligible because of the generally low to moderate Potential Fossil Yield Classification rank of the bedrock formations.

3.5.4.1.2 KM

Facility removal and reclamation activities for the KM would proceed within the Permit Area according to the provisions in the current KM closure and reclamation plan and SMCRA regulations (OSMRE 2017). As stated in the KM EA, indirect impacts on geologic strata, landforms, topography, mineral resources, and paleontological resources would be short-term and negligible because there would be little new disturbance from post-mining activities: mining operations would cease, facilities would be removed, open pits associated with the mining would be filled, and reclamation would take place within previously disturbed areas (*Id.*).

3.5.4.1.3 STS and WTS on Navajo Tribal Trust Lands

Retirement of the systems would represent a negligible short-term impact on geological, mineral, and paleontological resources as the necessary equipment is mobilized and the transmission system is removed. Once removed, there would be no long-term impacts. If the STS and WTS would continue to be operated, impacts would be the same as those under the Proposed Action alternative described in Section 3.5.4.2.3.

3.5.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. Impacts from these operations and retirement are discussed in the following sections.

3.5.4.2.1 NGS and Associated Facilities

There is limited potential for disturbance of geologic strata because ground disturbance is likely to occur in areas that have already been disturbed. The railroad would continue operations, and the surface footprint would not be enlarged during the period of operations from the end of 2017 to 2019. Direct impacts related to retirement activities for the Proposed Action would be the same as those stated for the No Action alternative. Conducting retirement activities over a 5-year period as opposed to a 2- to 3-year period, as proposed under the No Action alternative, would not generate impacts greater than those previously disclosed for the No Action alternative.

3.5.4.2.2 KM

As provided in the KM EA (OSMRE 2017), between 2017 and 2019, up to 16.2 million tons of coal would be mined, and mining operations and reclamation of previously mined areas would continue in the same manner as they have historically. In relationship to the total coal resource of 4.8 billion tons, this would be a negligible effect. Mining would remove about 250 feet of non-coal-bearing rock (overburden) from the geologic column above the coal. The mining represents the permanent loss of geological continuity of the overburden and the permanent loss of the mineral resource mined. The replacement of the overburden as backfill would result in a fragmented mixture of geologically distinct vertical layers of rock dissimilar to the surrounding unmined areas.

If important or unusual paleontological resources are detected during mining activity, work in the area would cease, and a qualified professional would evaluate the area for the recovery of important or unusual fossils prior to resuming mining operations. However, it is likely some fossils would inevitably be lost during the mining activities. Whether these lost fossils would be scientifically important is unknown. Mining impacts would not impede future mineral resources development if pursued.

Once mining stopped, impacts on geological, mineral, and paleontological resources would cease. Indirect impacts related to facility removal and reclamation activities for the Proposed Action would be the same as those stated for the No Action alternative.

3.5.4.2.3 STS and WTS on Navajo Tribal Trust Lands

Continued operation of the transmission systems represents a negligible short-term impact on geological, mineral, and paleontological resources. Operation and maintenance of the STS and WTS requires periodic aerial and ground inspections, repair and maintenance of infrastructure, maintenance of access routes, and treatment of vegetation within the ROW corridors to meet federal and industry reliability and safety standards (SRP 2017d). The procedures developed to maintain the systems avoid to the extent practical and minimize impacts on resources and the environment. Impacts from retirement would be the same as those under the No Action alternative described in Section 3.5.4.1.3.

3.5.5 Cumulative Effects

As stated in the KM EA (OSMRE 2017), the cumulative impacts would be from the continued removal of coal from the Wepo Formation that would occur under the Proposed Action. Since 1973, 8.1 million tons of coal has been mined annually at KM. Since the start of mining through 2014, 455 million tons of coal has been mined. Up to 16.2 million tons of coal would be mined between 2017 and 2019, which represents about 8 percent of the remaining coal planned to be mined under the current lease and about 0.3 percent of the 4.8 billion tons of coal reserves in the Wepo Formation. Therefore, the Proposed Action would contribute negligible cumulative effects on coal reserves when combined with past mining.

3.6 Soils

This section describes the affected environment and environmental consequences for soil resources in the analysis area. As summarized in Section 3.1.1, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.6.1 Regulatory Framework

Requirements for the management of soils at the KM are part of the mine permit under SMCRA. SMCRA outlines the minimum federal coal-mining requirements to restore land to a condition capable of supporting preexisting uses or to higher or better uses. There are no applicable federal regulations pertaining to soils for NGS operations.

3.6.2 Analysis Area

The analysis area for soil resources is the NGS and associated facilities, the KM, and the STS and WTS on Navajo Tribal Trust Lands.

3.6.3 Affected Environment

The soils of the analysis area range from a few inches to more than 5 feet deep and are generally well drained. Soils in many portions of the analysis area are subject to high wind and water erosion due to sparse vegetation cover, steep slopes, and soil type (AGFD 2006). The dominant soil orders in the Colorado Plateau area are Alfisols, Aridisols, Entisols, and Mollisols (U.S. Department of Agriculture [USDA] Natural Resources Conservation Service [NRCS] 2006). The soils have carbonatic, mixed, or smectitic mineralogy and are loamy or clayey.

3.6.3.1 NGS and Associated Facilities

The soils located within the NGS and associated facilities are derived from the Glen Canyon Group and San Rafael Group of sedimentary rocks underlying the analysis area. Based on soil surface sampling conducted at and in the vicinity of the NGS in 2014, metals concentrations detected were generally consistent with regional background soil conditions, and volatile organic compounds were not detected. Total mercury, selenium, and methylmercury were infrequently detected. Arsenic was widely distributed at low concentrations and is considered naturally occurring. There were no distinct spatial patterns of compound occurrences or concentrations that would suggest the influence of NGS historic emissions and deposition; thus, the sampling data and concentrations were considered reflective of baseline conditions for the area (Ramboll Environ 2016e).

3.6.3.2 KM

The following information is summarized from the KM EA (OSMRE 2017). The soils in the analysis area are derived from the Cretaceous Mesaverde Group, a series of sedimentary sandstones, siltstones, and mudstones. Detailed soil surveys were conducted in 1979, 1983, 1985, 2000, and 2003 to determine the thicknesses of suitable topsoil, subsoil, and unconsolidated material for reclamation use. The surveys identified 14 soils in and surrounding the area. These soils are predominantly very fine- to fine-grained sandy loams with minor smectitic clayey soils. The soils in the analysis area are well drained with moderate shrink-swell potential (except for the smectitic clayey soils) and are slightly susceptible to wind erosion.

The soils that occur in the analysis area are predominantly in the NRCS land capability Classes VI and VII, which are generally unsuitable for commercial cultivation. The soils in these groupings are used primarily for livestock grazing.

The topsoil in the analysis area is of insufficient quantity (from 0 to 1 inch and 0 to 4 inches thick) to salvage as a separate layer and must be salvaged together with suitable subsoil and suitable unconsolidated material below the subsoil to provide an average 2-foot-thick topsoil mixture suitable for reclamation. Overall, a 2-foot-thick suitable root zone is created per SMCRA requirements and the reclamation plan. When a more rocky topsoil material is needed to support the reclamation plan, PWCC salvages the suitable residual soils unless their depths make salvage impractical (OSMRE 2017).

PWCC conducts graded spoil sampling to identify and minimize potentially adverse effects on plant growth and the approved post-mining land use (30 CFR Parts 715.14(j) and 816.102(f)). Samples are collected on a grid pattern and analyzed for pH, electrical conductivity, sodium adsorption ratio, percent clay, percent rock fragments, calcium carbonate, and acid-based potential. If maximum thresholds are exceeded for any value, indicating the material could adversely affect plant growth or contribute to toxic levels of elements or compounds in aboveground plant parts, the grid is narrowed until the full extent of the potentially unsuitable overburden is determined. Additional overburden/spoil/topsoil is hauled to cover the area of unsuitable material so that the combination of suitable spoil/overburden and topsoil buries the unsuitable material at least 4 feet deep. PWCC maintains an inventory of unsuitable graded spoil and suitable soil supplements, which is updated on an annual basis (OSMRE 2017).

3.6.3.3 STS and WTS on Navajo Tribal Trust Lands

Soils along the WTS corridor are similar to those described above for the NGS facility. Soils along the STS corridor are derived from the Glen Canyon Group and San Rafael Group of sedimentary rocks underlying the area near the NGS facility and from the Triassic to Permian-age sedimentary bedrock underlying the southern portion of the corridor prior to it leaving Navajo Tribal Trust Lands. Soils located along the STS and WTS system were previously disturbed during construction of the systems but have revegetated to native vegetation similar to surrounding undisturbed areas.

3.6.4 Environmental Consequences

This section describes the direct and indirect effects of the No Action alternative, followed by the effects of the Proposed Action, and then the cumulative effects of the Proposed Action.

3.6.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would be retired by the end of 2019.

3.6.4.1.1 NGS and Associated Facilities

During retirement activities, direct impacts on soil resources in the analysis area would be short-term and limited to areas where heavy equipment is used on undisturbed soils. After retirement activities, operations would cease, vegetation would reestablish, and the soil horizon would equilibrate and recover. If a new solid waste landfill was constructed near the ash (CCR) disposal area, short-term impacts would occur during construction and filling of the landfill; however, upon closing and capping the landfill, long-term impacts would be negligible following reclamation activities. All restored land would be covered with topsoil indigenous to the area and revegetated with native plants, resulting in an increase in the amount of topsoil in the analysis area and a long-term beneficial impact on soil resources. The solid waste landfill would be closed and capped in place using a minimum of 12 inches of cover soil with vegetation to reduce erosion of the cover. The final grade plan would detail the drainage plan for the site and areas that would have a layer of topsoil placed versus the areas graded. Restoration would be conducted to a condition that would allow revegetation. The CCR landfill final cover system (Section 3.7.4.1.1) would include 24-inch-thick combined soil layers (18-inch-thick protective soil layer and minimum 6-inch-thick

soil erosion layer) sourced from local borrow sources capping the system that would be capable of supporting native plant growth (Haley Aldrich 2016).

3.6.4.1.2 KM

As provided in the KM EA (OSMRE 2017), facility removal and reclamation activities for the KM would proceed within the Permit Area according to the provisions in the current KM closure and reclamation plan and SMCRA regulations. Indirect impacts would be short-term and negligible during closure because mining operations would cease, facilities would be removed, open pits associated with the mining would be filled, and reclamation would take place within previously disturbed areas. Soils used for reclamation would be required to meet suitability standards including soil pH and acid-forming spoils, sodic zones, toxic substance occurrence in soil, percent and length of slope, and slope stability. In the short term, soil productivity and stability would be slow to develop in the arid climate, but required reclamation practices would help establish a diverse and permanent vegetation cover that would aid in redeveloping soil productivity. Soil productivity and stability would increase over time in the areas reclaimed, resulting in a beneficial long-term impact and suitability for post-mine land uses (livestock grazing, wildlife habitat, and cultural plants) (OSMRE 2017).

3.6.4.1.3 STS and WTS on Navajo Tribal Trust Lands

Retirement of the systems on Navajo Tribal Trust Lands would represent a short-term impact on soil resources as the necessary equipment is mobilized and the transmission system is removed. Once removed, long-term impacts would be negligible as the soil horizon equilibrates following the removal of the system. If the STS and WTS would continue to be operated, impacts would be the same as those under the Proposed Action alternative in Section 3.6.4.2.3.

3.6.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. Impacts from these operations and retirement are discussed in the following sections.

3.6.4.2.1 NGS and Associated Facilities

During continued operations between 2017 and 2019, there is limited potential for disturbance of soil resources because ground disturbance is likely to occur in areas that have already been disturbed. The railroad would continue operations, and the surface footprint would not be enlarged. Soil protection and erosion-control measures currently in place at the ash (CCR) disposal landfill would prevent soil erosion losses. The potential for soil contamination from spills would remain due to facility activities, such as the storage of chemicals and fuels. If spills occurred, they would result in short-term localized impacts that would require the removal of the contaminated soils in compliance with the spill prevention, control, and countermeasure plan for all NGS associated facilities.

Direct impacts related to retirement activities for the Proposed Action would be the same as those stated for the No Action alternative. Conducting retirement activities over a 5-year period as opposed to a 2- to 3-year period, as proposed under the No Action alternative, would delay the onset of soils recovering from retirement activities but would not generate impacts greater than those previously disclosed for the No Action alternative.

3.6.4.2.2 KM

As provided in the KM EA (OSMRE 2017), operation of the KM between 2017 and 2019 would be required to continue to meet or exceed SMCRA requirements for soil salvaging and reclamation. Vegetation clearing, topsoil removal, topsoil salvage (direct haul and stockpiling), and mining methods would continue as described for the existing operations. Topsoil would be salvaged together with suitable subsoil and underlying unconsolidated material to provide a topsoil mixture suitable for reclamation. Topsoil stockpiles would be protected for future use. Soil salvaging, surface mining, and road or support facilities construction activities would result in the homogenization of native topsoil with subsoil, the loss of the original soil profile, and the short-term loss of soil productivity. Mining operations and haul road construction would also increase short-term erosion and soil impacts with erosion controls used to reduce the effects of surface disturbance. Reclamation procedures would create a suitable 4-foot-thick plant root zone over the entire reclaimed area and establish a diverse and permanent vegetation cover. As a result, short-term impacts would occur for soil resources from surface disturbance that blends soil layers resulting in long-term loss of the original soil profile (OSMRE 2017). However, long-term impacts would be negligible since reclamation activities would restore the topography and improve the productivity of the soil structure (OSMRE 2017).

3.6.4.2.3 STS and WTS on Navajo Tribal Trust Lands

Continued operation of the transmission systems past 2019 represents a negligible short-term impact on soil resources. Operation and maintenance of the STS and WTS requires periodic aerial and ground inspections, repair and maintenance of infrastructure, maintenance of access routes, and treatment of vegetation within the ROW corridors to meet federal and industry reliability and safety standards (SRP 2017d). The procedures developed to maintain the systems avoid to the extent practical and minimize impacts on resources and the environment. Impacts from retirement would be the same as those under the No Action alternative in Section 3.6.4.1.3.

3.6.5 Cumulative Effects

Cumulative effects would result from the addition of the Proposed Action to previous effects from NGS operations and KM mining. Construction of the NGS facilities began in 1969 with power production starting in 1973. Two years of operation would produce negligible changes to soil resources in comparison to those that have occurred since 1969 because the footprint of the operations would not be altered. The KM has been producing coal for the NGS plant since 1973. As stated in the KM EA (OSMRE 2017), surface disturbance from past coal mining in the KM Permit Area totals 25,550 acres, which includes 18,150 acres that have been reclaimed as of September 2016. This represents 1.4 percent of the cumulative impact area. Two years of mining would produce negligible changes in soil resources in comparison to the amount that has occurred since 1973.

3.7 Solid and Hazardous Waste

This section describes the affected environment and environmental consequences for solid and hazardous waste generation and storage in the analysis area. A solid waste is any garbage or refuse; sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility; or other discarded material resulting from industrial, commercial, mining, or agricultural operations or from community activities (EPA 2017a). From EPA (2017b): "A solid waste is a hazardous waste if it is specifically listed as a known hazardous waste or meets the characteristics of a hazardous waste. Characteristic wastes are wastes that exhibit any one or more of the following characteristic properties: ignitability, corrosivity, reactivity, or toxicity."

As summarized in Section 3.1.1, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.7.1 Regulatory Framework

Regulations dealing with solid and hazardous wastes generated from mining and power generation operations are required to be in compliance with the Resource Conservation and Recovery Act (RCRA), Federal Water Pollution Control Act (Clean Water Act), Safe Drinking Water Act, Toxic Substances Control Act, MSHA, CAA, and Department of Transportation regulations.

Effective October 19, 2015, the EPA issued the Disposal of Coal Combustion Residuals from Electric Utilities rule (Rule), which regulates the disposal of CCR including fly ash, bottom ash, boiler slag, and flue gas desulfurization materials (FGDM) from coal-fired power plants. The Rule contains key milestones for implementation and requires the NGS to provide demonstration of compliance with the requirements, including posting documents to an operating record and publicly accessible internet site and notifying the Nation. The Rule establishes self-implementing requirements, primarily performance standards that owners or operators of regulated units can implement without any interaction with regulatory officials. Beneficial uses of CCR in place of a natural resource (e.g., in concrete as a partial replacement for aggregate, as sanding material on a road, or in manufactured drywall boards) is excluded from federal regulation (EPA 2017d).

3.7.2 Analysis Area

The analysis area for solid and hazardous waste is the NGS and associated facilities, the KM, and the STS and WTS on Navajo Tribal Trust Lands.

3.7.3 Affected Environment

3.7.3.1 Current Waste Disposal Practices

3.7.3.1.1 NGS and Associated Facilities

The NGS plant is a Small Quantity Generator (SQG), as defined under RCRA, due to its generation of between 220 and 2,200 pounds of waste per month. The NGS implements a Hazardous Waste Minimization Plan to minimize waste generation using recycling, reclaiming, and reusing practices and process modifications. As a result of these practices, annual waste generation has decreased over the period of operation of the plant. The NGS disposes of the solid and hazardous wastes generated using its on-site landfills and off-site landfills and recycling facilities. Table 23 summarizes the NGS waste material quantities and disposal.

Table 23. Annual Waste Material Quantities and Disposition.

Waste Stream	Average Annual Amount over a 5-Year Period (2010–2014)	Annual Amount Generated (2014)	Ultimate Disposition/Site	Transportation
Solid Waste (Non-RCRA)	Not Available	3,848 cubic yards	Washington County Landfill	Republic Services
Solid Waste (Non-RCRA)	Not Available	<1,000 cubic yards (estimated)	NGS Solid Waste Landfill (inactive in 2015)	N/A
Asbestos-Containing Material	135 cubic feet	24 cubic feet	NGS Asbestos Landfill	N/A
Used Oily Rags	23.1 tons	19.2 tons	Subtitle D Landfill / Waste Management – Butterfield Landfill	MP Environmental Services, Inc.
Arsenic-Treated Cooling Tower Wood (exempted wastes)	1.53 tons	0 tons	Subtitle D Landfill / Waste Management – Butterfield Landfill	MP Environmental Services, Inc.
Hazardous Wastes (e.g., lab wastes, mixed solvents, and oil-based paint)	3,165 pounds	1,274 pounds	Clean Harbors – Aragonite, UT (incineration) and Grassy Mountain, UT (Subtitle C landfill); Veolia, Port Arthur, TX (incineration); US Ecology, Beatty, NV (Subtitle C landfill)	MP Environmental Services, Inc.
Used Oil	11,677 gallons	17,120 gallons	Recycled with Thermofluids	Thermofluids
Universal Wastes (e.g., lamps, batteries, and mercury-containing equipment)	• 820 pounds of lamps • 153 pounds of batteries • 957 pounds of mercury-containing equipment	• 1,385 pounds of lamps • 114 pounds of batteries • 142 pounds of mercury-containing equipment	Recycled with Veolia, Phoenix, AZ	Veolia Phoenix
Polychlorinated Biphenyl Electrical Equipment	1,057 kilograms	920 kilograms	Clean Harbors – Aragonite, UT (incineration) and Grassy Mountain, UT (Subtitle C landfill); Veolia, Port Arthur, TX (incineration); US Ecology, Beatty, NV (Subtitle C landfill)	MP Environmental Services, Inc.

Source: NGS O&M Plan, SRP 2017d.

Three on-site landfills are used by the NGS—an asbestos landfill, an ash (CCR) disposal landfill, and a solid waste landfill. Figure 10 displays the locations of the landfills.

Figure 10. Landfill Locations.

The asbestos landfill is a 3-acre EPA-permitted landfill used exclusively by the NGS to dispose of asbestos-containing waste generated during abatement and demolition activities. The landfill perimeter is secured with fencing and a perimeter gated entrance. Individual 24-foot by 30-foot by 4-foot-deep cells are filled with asbestos waste that has been wrapped or double-bagged during handling and transported to the landfill. At the end of each day or once every 24 hours, the disposed asbestos waste is covered with at least 6 inches of compacted non-asbestos-containing material.

The ash (CCR) disposal landfill is a 765-acre regulated CCR landfill located 1.5 miles east of the NGS facility where generated CCR (fly ash, economizer ash, bottom ash, and flue-gas desulfurization–gypsum byproduct) not destined for off-site recycling is sent for disposal. Depending on market demand, about 50 to 90 percent of the fly ash generated at the NGS is recycled annually. The CCR is sent to the landfill via trucks along the ash disposal road. The CCR is deposited at the landfill in up to 15-foot layers or lifts forming embankment terraces, which are covered with a final 2-foot-thick top layer of native soils. The site is set against the western edge of a mesa outcrop and has a design capacity of 38 million cubic yards. The existing site can hold all of the anticipated CCR generated by the NGS through 2019.

The solid waste landfill is a 13-acre landfill formerly used by the NGS prior to its closure in 2015. Solid waste is currently sent to off-site landfills. Historically the landfill received mostly industrial waste, construction materials, and miscellaneous demolition debris.

The NGS O&M Plan (SRP 2017d) provides additional information on waste management.

3.7.3.1.2 KM

The following information is summarized from the KM EA (OSMRE 2017). As part of the KM's current mining activities, the solid and hazardous wastes produced are recycled where practicable or disposed of by licensed contractors at an off-site EPA-permitted hazardous waste facility. Recycled products include scrap metal, tires, batteries, computer equipment, fluorescent lamps (4-foot and 8-foot lengths), high-pressure sodium lightbulbs, and mercury-vapor lightbulbs. Used oil, parts washer fluid, spent solvent, grease, and antifreeze are recycled as appropriate. Potential sources of hazardous or solid waste include spilled, leaked, or dumped hazardous substances, petroleum products, and solid waste associated with mine operation or maintenance activities. Petroleum products, hazardous materials, and materials that could be classified as hazardous include greases, solvents, paints, flammable liquids, and other combustible materials. Wastes produced by current mining activities at the mine are handled according to the procedures described in the approved mine permit. The procedures and requirements for handling hazardous and solid wastes comply with EPA-approved waste disposal plans (OSMRE 2017).

3.7.3.1.3 STS and WTS on Navajo Tribal Trust Lands

The STS and WTS generate negligible quantities of wastes associated with maintenance of the systems.

3.7.4 Environmental Consequences

This section describes the direct and indirect effects of the No Action alternative, followed by the effects of the Proposed Action, and then the cumulative effects of the Proposed Action.

3.7.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would be retired by the end of 2019.

3.7.4.1.1 NGS and Associated Facilities

During retirement activities, large quantities of solid and hazardous waste would be generated because the NGS facilities and the catenary system for the railroad would be removed. To reduce the volume of waste that would need to be disposed of, salvage or recycling of scrap metals, operating equipment, spare equipment, warehouse stock, process chemicals and fuels, and catenary railroad equipment would be undertaken. Solid inert wastes generated from the demolition of facility buildings would be reused as on-site backfill and may be blended with crushed residual coal, limestone, crushed concrete, asphalt, and railroad ballasts. In addition, any coal spilled along the railroad ROW would be removed and blended for use as on-site backfill.

Retirement actions for the ponds are summarized in Section 2.4.1.1 and would be similar to activities as described under the Proposed Action.

The potential new landfill is estimated to accommodate up to 170,000 tons of waste, but the size, capacity, access, and types of waste are subject to negotiation between the Lessees and the Nation. If constructed, the new landfill would be constructed following Nation solid waste landfill permitting specifications and criteria and would include leakage controls consisting of liners and a leachate recovery system. The current solid waste landfill would be used for all solid waste up to its design capacity and then closed and capped in place using a minimum of 12 inches of cover soil (SRP 2017c).

CCR remaining in the burners upon closure would be disposed of at the ash (CCR) disposal area, and the disposal area would be closed in place upon receipt of all wastes destined for the landfill per CCR regulation requirements. A separate agreement between the Lessees and the Nation would need to be executed to enable CCR landfill monitoring to continue after closure for an additional 30 years following NGS retirement. The CCR landfill would be closed in place in accordance with EPA rules and regulatory guidance (80 Fed. Reg. 21301; 40 CFR Part 257) and the associated written closure plan for the landfill (Haley Aldrich 2016). Closure of the CCR landfill would consist of capping the landfill by constructing a final cover system to include grading of the surface; and placement of a geomembrane overlain with a geocomposite drainage layer, an 18-inch-thick protective soil layer, and a 6-inch-thick soil erosion layer (Haley Aldrich 2016).

Hazardous wastes generated during retirement activities would be disposed of off-site in accordance with applicable waste handling regulatory requirements. Asbestos-containing building materials would be removed during demolition in accordance with applicable regulations and disposed of off-site at an appropriate waste disposal facility. The asbestos landfill would be removed and disposed of off-site at an appropriate waste disposal facility in accordance with applicable regulations. During retirement, all activities would comply with applicable federal rules and regulations regarding health and safety and handling and disposal of hazardous materials and wastes (SRP 2017c).

Once retirement activities were completed, long-term impacts would be negligible.

3.7.4.1.2 KM

As provided in the KM EA (OSMRE 2017), facility removal and reclamation activities for the KM would proceed within the Permit Area according to the provisions in the current KM closure plan and SMCRA regulations. Removal of mining facilities would initially produce large quantities of waste. Hazardous and asbestos-containing wastes would be disposed of off-site in accordance with applicable regulations. During the reclamation period, all activities would comply with applicable federal rules and regulations regarding health and safety and handling and disposal of hazardous materials and wastes. Once reclamation activities were completed, long-term impacts would be negligible.

3.7.4.1.3 STS and WTS on Navajo Tribal Trust Lands

Retirement of the transmission lines would generate solid and hazardous wastes that would require appropriate waste disposal in accordance with applicable regulations. Recycling of the transmission line tower structures would lessen the waste generated. Once retired, generation of waste would cease. If the STS and WTS would continue to be operated, impacts would be the same as those under the Proposed Action alternative described in Section 3.7.4.2.3.

3.7.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. Impacts from these operations and retirement are discussed in the following sections.

3.7.4.2.1 NGS and Associated Facilities

Continued operation of the NGS facilities would generate solid and hazardous wastes in similar quantities as those discussed in the Affected Environment section. Direct impacts would be negligible due to the NGS plant continuing to operate as a SQG and generating between 220 and 2,200 pounds of waste per month. During operations, accidental spills could occur, resulting in soil contamination in localized areas that would require removal of contaminated waste in accordance with procedures in the NGS O&M Plan (SRP 2017d) including compliance with a spill prevention, control, and countermeasure plan for all NGS and associated facilities. During operations, the NGS environmental department would continue to conduct weekly ash disposal landfill inspections per CCR regulations, and any issues noted would be identified and resolved.

Direct impacts related to retirement activities for the Proposed Action would be the same as those stated for the No Action alternative. Conducting retirement activities over a 5-year period as opposed to a 2- to 3-year period, as proposed under the No Action alternative, is not likely to alter the volume of wastes generated and, therefore, would not generate impacts greater than those previously disclosed for the No Action alternative.

Caps for the landfills would be maintained by the Lessees for 30 years, and the Restrictive Covenants would prevent disturbance to landfills, closed and capped ponds, and the ash (CCR) disposal area in perpetuity to ensure erosion does not begin to expose the materials at the surface.

3.7.4.2.2 KM

Continued operation of the KM would generate solid and hazardous wastes that would be handled in the same manner as those discussed in the Affected Environment section. The related indirect impacts would be short-term and negligible. Indirect impacts related to retirement activities for the Proposed Action would be the same as those stated for the No Action alternative but would be initiated about 2 years later (OSMRE 2017).

3.7.4.2.3 STS and WTS on Navajo Tribal Trust Lands

Continued operation and maintenance of the STS and WTS lines past 2019 would generate negligible quantities of waste that would be disposed of in compliance with applicable federal rules and regulations. Impacts from retirement would be the same as those under the No Action alternative described in Section 3.7.4.1.3.

3.7.5 Cumulative Effects

Cumulative effects would result from previous effects of NGS operations and KM mining in addition to the effects of the Proposed Action. Construction of the NGS facilities began in 1969 with power production starting in 1973. Two additional years of operation would produce negligible quantities of wastes in comparison to the total wastes generated since 1969. The KM has been producing coal for the NGS plant since 1973. Two years of mining would produce a negligible quantity of waste in comparison to the amount produced since 1973 since mining practices and operations have not changed substantially.

3.8 Water Resources

This section describes the affected environment and environmental consequences for surface water and groundwater resources in the analysis areas potentially affected by various components of the project. The analysis areas and regulatory framework are presented first, followed by descriptions of the affected environment. This section concludes with environmental consequences describing the direct and indirect effects of the Proposed Action and No Action alternatives, followed by cumulative effects. As summarized in Section 3.1.1, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.8.1 Regulatory Framework

Water management at the NGS and the KM is subject to a number of regulatory programs and BMPs designed to protect water resources. The regulatory framework and details of facilities and activities associated with water protection at the NGS are provided as part of Appendix 2 and the NGS O&M Plan (SRP 2017d). Similar information for the KM is provided in Sections 3.7.1.1 and 3.7.2.1 of the KM EA (OSMRE 2017).

3.8.2 Analysis Areas

The analysis area for surface water resources affected by NGS withdrawals is Lake Powell. Surface water resources on the KM Permit Area and downstream are associated with ephemeral to intermittent washes that drain the upper elevations of Black Mesa and are subject to periodic flood flows from storm events. Figure 11 shows the overall water resource analysis areas, and Figures 3.7-1 and 3.7-2 in the KM EA (OSMRE 2017) show the more detailed water resource study areas in the vicinity of the mine. The analysis area for water quality effects from NGS emissions that may affect special status aquatic species are described in Section 3.9 and include Lake Powell, the mainstem of the Colorado River upstream and downstream from Lake Powell, and the San Juan River Basin, which drains into Lake Powell.

The primary groundwater analysis area is the N-Aquifer, a regional aquifer that underlies Black Mesa and extends beneath the NGS to Lake Powell. The N-Aquifer is not used for NGS purposes, but if NGS leakage was to occur, there would be potential to affect N-Aquifer water quality. The N-Aquifer provides dust control and potable water for the KM and nearby residents, and water supply for the Navajo and Hopi communities. Various springs discharge from the N-Aquifer where the water-bearing zone intersects the land surface at distances of approximately 10 miles or greater from the KM, near the confined/unconfined boundary of the aquifer. Figure 3.7-1 in the KM EA (OSMRE 2017) depicts the KM analysis area for the N-Aquifer.

Another analysis area is a small localized perched water zone immediately beneath the NGS. The perched water is due to leakage from plant operations.

The water resource analysis areas for the STS and WTS involve ephemeral to intermittent washes crossed by the transmission lines and their access routes on Navajo Tribal Trust Lands, which are shown on Figure 11.

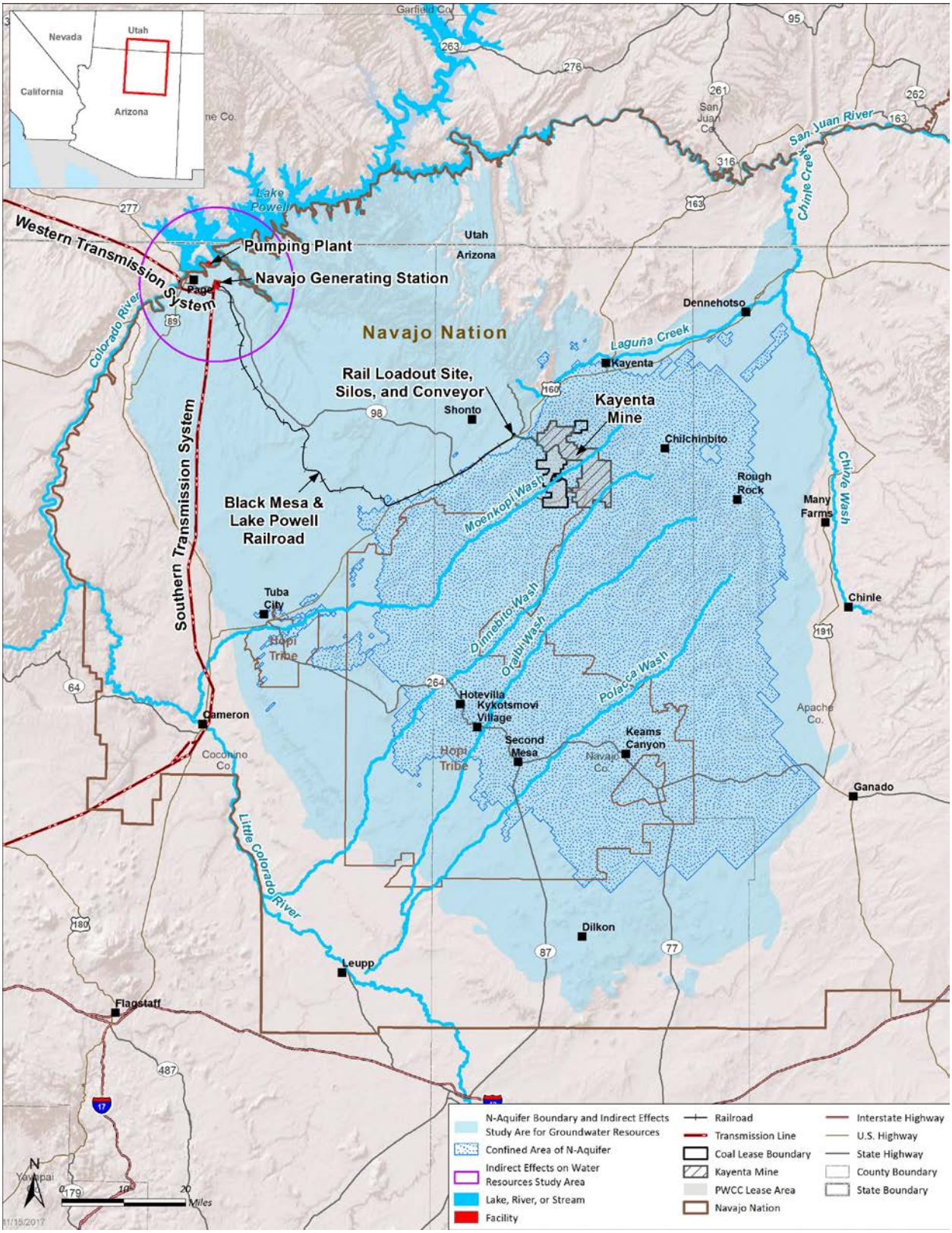

Figure 11. Overall Water Resources Analysis Areas.

3.8.3 Affected Environment

Precipitation and evaporation in the analysis areas reflect the semiarid climate of the region. Average annual precipitation varies from about 6.5 inches at the NGS to about 8 inches at the KM (OSMRE 2011b). Average annual evaporation is nearly an order of magnitude greater than precipitation with about 56 inches per year at the NGS (WRCC 2017).

The following subsections describe the affected environment in each of the primary analysis areas: Colorado River surface water, NGS perched water, N-Aquifer beneath the NGS, KM washes and ponds, KM springs, KM aquifers, and drainages under transmission lines.

3.8.3.1 Colorado River Surface Water

Lake Powell, the analysis area for surface water resources, is shown on Figure 11.

3.8.3.1.1 Water Supplies

Glen Canyon Dam impounds the Colorado River in Lake Powell near Page, Arizona, which provides the water supply for the NGS. The capacity of Lake Powell is 26.2 million acre-feet (MAF) with a surface area of 252.2 square miles. Lake Powell storage volumes fluctuate seasonally and from year to year, depending on inflow and dam releases. Average annual inflow, primarily from the mainstem and San Juan River, varies based on upstream precipitation. Since 2000, average inflow has been approximately 8.4 MAF annually, which is less than 80 percent of the average for the period 1981–2010. In the water year ending September 30, 2017, inflow to Lake Powell is forecast to be about 12.2 MAF (113 percent of average), resulting in 15.0 MAF in storage (62 percent of capacity). Low inflows in recent years have led to lower storage volumes; the lowest level historically was in early April 2005 when total storage was 9.8 MAF with a surface area of 115.3 square miles (Reclamation 2017). Water quality in Lake Powell, the Colorado River, and the San Juan River is good and suitable for most uses, including drinking water with appropriate treatment (NPS 2015).

3.8.3.1.2 Water Rights

SRP and Reclamation executed the 1969 Water Service Contract to divert water from Lake Powell. It provides that SRP may divert up to 40,000 acre-feet annually (AFA) from Lake Powell and may consumptively use (deplete) up to 34,100 AFA at the NGS, with the remainder of 5,900 AFA for nonconsumptive use (i.e., it must return to the Colorado River). The allocation of 34,100 AFA for consumptive use is part of Arizona's 50,000 AFA share of the Upper Colorado River Basin. SRP assigned interests in the contract to APS, LADWP, NV Energy, and TEP. The 1969 Water Service Contract had an initial 40-year term with rights of renewal. It was renewed on July 6, 2012, for 20 years with a change in the water service rate beginning January 1, 2014.

SRP holds two water rights certificates issued by the ADWR for water use at the NGS totaling 28,709 AFA. Certificate No. 4050.0001 has a priority date of December 18, 1964, for 23,065 AFA, which expires on December 18, 2044. Certificate No. 4050.0003 has a priority date of April 9, 1969, for 5,644 AFA, which expires on April 9, 2049. Because NGS water use has not increased in recent years, SRP has not needed to submit proofs of appropriation to ADWR for additional quantities of water up to the total allowable consumptive use of 34,100 AFA. The 5,900 AF available for nonconsumptive use has never been used.

In 2014, the most recent year for which data are available, the total estimated consumptive use in Arizona's Upper Colorado River Basin was estimated to be 35,630 AFA, of which the NGS used 25,810 AFA. The remainder of the Upper Colorado River Basin use estimates involve Nation agriculture (2,134 AFA), municipal and industrial uses (3,808 AFA—primarily by Page and Nation communities), recreation and wildlife (1,407 AFA), and evaporation from Nation reservoirs (2,471 AFA) (Reclamation 2016a).

The Nation has never waived claims or agreed to be limited to Arizona's 50,000 AFA allocation from the Upper Colorado River Basin under the Upper Colorado River Basin Compact of 1948. However, by Navajo Nation Council Resolution CD-108-68, the Nation agreed that up to 34,100 AFA could be used by the NGS out of Arizona's allocation and that Navajo uses would be limited so that no more than 50,000 AF would be consumed by all water users in the Upper Basin in Arizona in any year for the life of the plant or 50 years, whichever occurred first. Subsequently, by Navajo Nation Council Resolution CJN-50-69, the Nation agreed to the use of 3,000 AFA for community and recreation developments around Lake Powell in Arizona.[26]

3.8.3.2 NGS Perched Water

A shallow perched water zone has formed in the low permeability Carmel Formation underlying the immediate area beneath the NGS plant site. The perched water zone is less than 70 feet deep, and the depth to the top of the perched water ranges from about 7 to more than 20 feet below ground surface (bgs). Below the perched water zone, an estimated 850 to 900 feet of unsaturated Page Sandstone is underlain by Navajo Sandstone that separates the perched water in the Carmel Formation from the N-Aquifer. The relative locations of the Carmel Formation and N-Aquifer are shown in Figure 12. More information on these geologic formations is provided in Section 3.5.

The perched water contains elevated levels of total dissolved solids (TDS) and sulfate, as well as some metals (no metals are at hazardous levels). More information on the hydrogeology beneath the plant site is provided in Appendix 2 to Appendix C of the NGS O&M Plan (SRP 2017d). Sources of the perched water include past seepage from evaporation ponds, unlined drainage ditches, cooling towers, and the ash dewatering area. No perched water has been detected under the ash (CCR) disposal area (SRP 2017d). There is not sufficient information available to determine which source has contributed the most to the perched water.

Corrective actions have been taken at the NGS to address the perched water conditions beneath the plant site. These corrective actions include upgrades to the pond liners, upgrades to linings in the drainage ditches of the ash dewatering area, and repairs to cooling tower basins. Additionally, six shallow monitoring wells pump water to control migration of the perched water. The recovered water is reclaimed into the plant processes. Water levels are reported to be dissipating in the plant pond areas since the ponds are lined. However, leakage appears to be continuing in the cooling tower area. Semiannually, static water levels and samples are obtained from a number of shallow and deep wells to monitor hydrologic conditions. More information on corrective actions and related information are provided in Appendices 1 and 2 to Appendix C of the NGS O&M Plan (SRP 2017d).

[26] Navajo Nation Council Resolution CJN-50-68 is available at http://www.nnwrc.navajo- nsn.gov/.

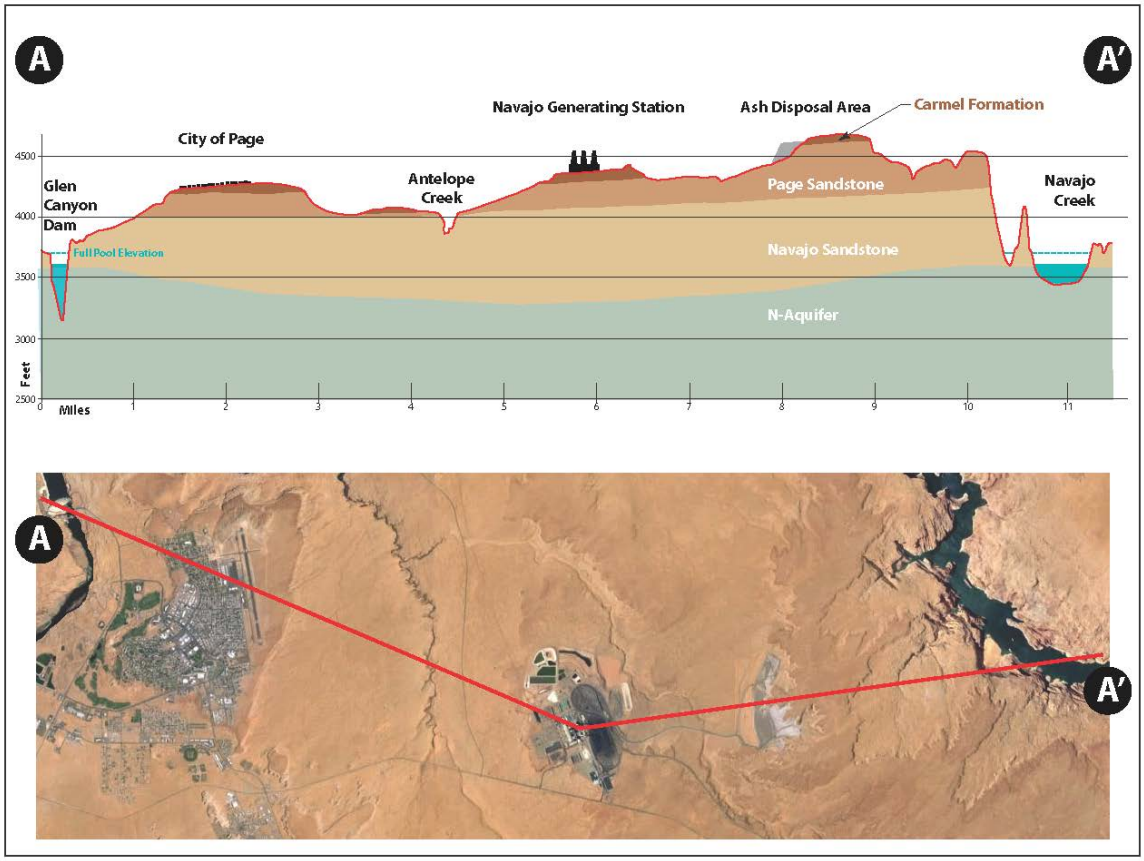

Figure 12. Hydrogeologic Cross-Section at the NGS (Source: SRP 2017e).

Appendix C to the NGS O&M Plan describes SRP's Groundwater Protection Plan for the NGS, which involves routine inspections, pond leak detection, perched water recovery and monitoring, N-Aquifer monitoring, and mitigation activities consistent with state and federal regulations (SRP 2017d). The Groundwater Protection Plan contains details regarding water management facilities at the NGS, their inspections and monitoring, emergency contingency plans, and the closure and post-closure care planning and reporting efforts. Also included are specific components involving protocols for sampling, analysis, and validation; water quality standards that would be used to trigger corrective actions; enforceable action levels based on federal standards; and reporting requirements.

3.8.3.3 N-Aquifer beneath the NGS

The Navajo Sandstone is approximately 1,400 feet thick in the NGS area and is unconfined, with the water level at a depth of about 850 to 900 feet bgs. Due to the depth of groundwater, no wells produce water from the Navajo Sandstone near the NGS. Thus, the NGS and the nearby city of Page and Navajo community of LeChee rely on surface water from the Colorado River to meet municipal and industrial needs (Reclamation 2009).

Prior to 1981, groundwater in the N-Aquifer flowed toward the Colorado River. However, due to the filling of Lake Powell beginning in 1960, water levels in the aquifer beneath the NGS have risen from 40 to 80 feet. Groundwater flow also has changed from southeast–northwest to northeast–southwest. The

water quality of groundwater in this portion of the N-Aquifer is considered excellent, consisting of calcium bicarbonate type water with relatively low concentrations of TDS ranging from 95 milligrams per liter (mg/L) to 160 mg/L (SRP 2017d).

Appendix 2 to the NGS Groundwater Protection Plan (provided in Appendix C of the NGS O&M Plan [SRP 2017d]) describes the geologic conditions and monitoring results of the N-Aquifer at the NGS. Water quality in the deep N-Aquifer wells has been regularly monitored since the mid-1990s. Background samples were collected in 1979 and 1981. With the exception of a temporary spike in well DW-2 in the late 1980s, TDS and sulfate have remained essentially at background levels, ranging from 100 to 160 mg/L and 10 to 45 mg/L, respectively. Well DW-2 was found to be leaking shallow water down the well from below the surface casing and was rehabilitated in 1989 by installing a casing liner to a depth 660 feet bgs. Following the installation of the casing liner, TDS and sulfate concentrations returned to background levels (SRP 2017d). There is no evidence of a long-term increase in TDS concentrations in the deep wells, either from plant operations or from Lake Powell.

N-Aquifer samples at the NGS also indicate that concentrations of nitrate-nitrogen and fluoride are relatively low and are less than the EPA Maximum Contaminant Levels (MCL) for drinking water (10 mg/L and 4 mg/L, respectively). Nitrate levels generally are less than 3 mg/L, and fluoride levels generally are less than 1 mg/L. Recent (2011–2012) concentrations of trace elements, including arsenic, barium, cadmium, chromium, lead, and selenium, are less than the drinking water MCLs and are below appropriate laboratory detection levels in the majority of samples. For example, the MCL for arsenic is 0.1 mg/L, and concentrations in N-Aquifer samples from the NGS range from less than 0.002 mg/L to 0.0062 mg/L. Selenium concentrations are all below the 0.002 mg/L detection limit, much less than the selenium MCL of 0.05 mg/L. Mercury concentrations are all below the 0.0002 mg/L detection limit, much less than the mercury MCL of 0.002 mg/L. More information on N-Aquifer water quality is available in Appendix 2 to Appendix C of the NGS O&M Plan (SRP 2017d).

3.8.3.4 KM Washes and Ponds

Major drainages on or near Black Mesa that are tributary to the Little Colorado River include Moenkopi Wash, Dinnebito Wash, Oraibi Wash, Polacca Wash, Jeddito Wash, Pasture Canyon, Begashibito Wash, and Shonto Wash. Along the north side of Black Mesa, Laguna Creek drains to Chinle Creek, a tributary of the San Juan River. On Black Mesa, these drainages are primarily ephemeral with some short intermittent or perennial reaches supported by spring flow. Flow is highly variable, ranging from a few cubic feet per second (cfs) to more than 10,000 cfs, primarily in response to storm runoff. Sediment control structures on the KM Permit Area impound a small amount of water in the drainage areas of Dinnebito and Moenkopi Washes. More information on surface water quantity in the washes is available in Section 3.7.1.2 of the KM EA (OSMRE 2017).

Water quality in the Black Mesa washes is variable but generally is suitable for livestock and wildlife use. Relatively high levels of total suspended solids and sulfate occur in the washes during storm events, whereas TDS are relatively high during low flows. Exceedances of water quality standards for livestock, wildlife, and aquatic habitat use occasionally occur during storm runoff events with respect to total suspended solids, TDS, lead, cadmium, mercury, selenium, vanadium, arsenic, chromium, and aluminum (OSMRE 2017).

Water quality in the sediment control ponds is similar to that in the washes but not as variable. Sample data typically are within livestock, wildlife, and aquatic habitat water quality standards. Concentrations of TDS, sulfate, calcium, magnesium, sodium, and chloride are typically lower in ponds compared to washes. Occasional exceedances of water quality standards occur for pH, TDS, sulfate, chloride, aluminum, iron, cadmium, copper, lead, mercury, and aluminum (OSMRE 2017).

Additional information on surface water quality in washes and ponds is available in Sections 3.7.1.3 and 3.7.1.4 of the KM EA (OSMRE 2017).

3.8.3.5 KM Springs

There are more than 200 springs from the D and N aquifers in the analysis areas. Prior to 2006, 15 of those springs had discharges greater than 10 gallons per minute (gpm), but all of them have had discharges of less than 10 gpm since 2006 (Leake et al. 2016). In addition, approximately 37 small springs currently or historically discharged from the shallow Wepo Formation in the vicinity of the KM (OSMRE 2017). Water quality of the springs is consistent with the water quality in the aquifer that supports them (see the next subsection).

3.8.3.6 KM Aquifers

In ascending order, the following aquifers lie beneath Black Mesa: N, D, Wepo, and alluvial. The stratigraphic column is shown in Figure 3.2-1 of the KM EA (OSMRE 2017). Shale layers between the Wepo, D, and N aquifers limit the downward movement of water between the aquifers. Each of these aquifers is discussed below.

3.8.3.6.1 N-Aquifer

The N-Aquifer includes the Navajo Sandstone, deeper sandstones of the Kayenta Formation, and the Lukachukai member of the Wingate Formation. The N-Aquifer lies beneath most of Black Mesa and is relatively thin near the southern edges of the mesa and is thickest in the northwestern part of the mesa beneath the KM Permit Area. This aquifer is confined with artesian conditions in the central and northern portions under Black Mesa and unconfined elsewhere. Recharge estimates vary from about 12,000 to 14,000 AFA (Leake et al. 2016). Groundwater storage in the N-Aquifer is estimated to be about 450 MAF (OSMRE 2017). Total groundwater pumping from the N-Aquifer on and near Black Mesa averaged 4,190 AF from 2009 to 2012, consisting of 1,330 AF (one-third) by PWCC and 2,860 AF (two-thirds) by tribal municipal systems (Macy and Truini 2016).

Water quality in the N-Aquifer typically meets water quality standards for municipal water supply with TDS generally less than 500 mg/L and rarely exceeding 1,000 mg/L except along the eastern edge of Black Mesa where sodium concentrations are elevated. In the southern part of Black Mesa, downward leakage of water from the D-Aquifer to the N-Aquifer influences water quality in the N-Aquifer (OSMRE 2017).

Additional information on the N-Aquifer is available in Section 3.7.2.4 and Appendix F of the KM EA (OSMRE 2017).

3.8.3.6.2 D-Aquifer

The D-Aquifer is in the central portion of Black Mesa and covers about 3,125 square miles under the Navajo and Hopi Tribal Trust Lands. The D-Aquifer consists of the Dakota Sandstone and other sandstone formations and is underlain by the slowly permeable Carmel Formation, which limits downward seepage to the N-Aquifer. Recharge is estimated to be about 5,500 AFA, and total storage is estimated to be 15 MAF. Median water levels under the Hopi Tribal Trust Land are about 270 feet bgs, which have been stable since 1990 (ADWR 2009). Water is primarily pumped from the D-Aquifer by windmills for stock water use and by some communities on Black Mesa. Historically, several of the PWCC production wells received water from the D-Aquifer system, but that is no longer the case because two of the wells have been abandoned and one well was sealed off from the D-Aquifer (OSMRE 2017).

Water quality in the D-Aquifer is not as good as that in the N-Aquifer because of elevated chloride, sulfate, and fluoride levels. TDS generally is above 1,000 mg/L, thus exceeding the recommended limit of 500 mg/L for drinking water (OSMRE 2011b).

Additional information on the D-Aquifer is available in Section 3.7.2.4 and Appendices D and F of the KM EA (OSMRE 2017).

3.8.3.6.3 Wepo Formation

The Wepo Formation is part of the Mesa Verde Group, which is the uppermost lithologic unit in the analysis area. The Wepo Formation contains the coal mined at the KM, and mining operations occasionally intercept local areas of groundwater within the Wepo Formation. The Wepo Formation also contains low-yielding perched aquifers that are not continuous and are frequently dissected and drain into drainages such as Yellow Water Canyon Wash, Coal Mine Wash, Moenkopi Wash, and Dinnebito Wash and their tributaries. Depth to water generally ranges from 30 to 150 feet bgs. The Wepo Formation receives direct recharge from precipitation because it is exposed on the surface. A number of windmills pump livestock water from the Wepo Formation (OSMRE 2017).

Wepo Formation water quality is variable and usually meets standards for livestock use with occasional exceedances for pH. TDS is typically greater than 1,000 mg/L (OSMRE 2017).

Additional information on water quantity and quality in the Wepo Formation is available in Section 3.7.2.3 and Appendix D of the KM EA (OSMRE 2017).

3.8.3.6.4 Alluvial Aquifers

Dinnebito, Reed Valley, lower Coal Mine, and lower Moenkopi Washes have the largest amount of alluvium and saturated alluvial material on and immediately downstream of the KM Permit Area. Some upper reaches of the major washes and tributaries contain little or no alluvial water. Channel alluvium is recharged from infiltration of surface water runoff, from direct precipitation, and from the Wepo Formation. Saturated thickness ranges from 3 to 34 feet. Depth to water typically ranges from 3 to 10 feet bgs. Shallow wells, springs, and ponds in saturated alluvium provide water for livestock and wildlife use (OSMRE 2017).

Water quality in the alluvium is variable by location and season but usually meets standards for livestock use with occasional exceedances for pH. TDS is typically greater than 2,000 mg/L (OSMRE 2017).

Additional information on the alluvial aquifers is available in Section 3.7.2.2 and Appendix D of the KM EA (OSMRE 2017).

3.8.3.7 Drainages under the STS and WTS

Nearly all of the drainages crossed by the transmission lines on Navajo Tribal Trust Lands are ephemeral sandy washes that only flow in response to precipitation. The STS also crosses Moenkopi Wash near Tuba City and the Little Colorado River near Cameron, Arizona, where the river and wash are intermittent in those reaches (ADWR 2009).

Water quantity and quality data were not compiled for the drainages under transmission lines because limited data are available and historical and future effects from transmission system O&M are indeterminable. On-the-ground transmission O&M activities are limited to periodic inspections, line and tower repair, maintenance of access routes, and vegetation treatments (SRP 2017d). All of these activities avoid ephemeral washes and intermittent streams, especially when they are wet or flowing. Thus, effects on water quantity and quality have been and would continue to be unmeasurable.

3.8.4 Environmental Consequences

This section describes the direct and indirect effects of the No Action alternative, followed by the effects of the Proposed Action, and then the cumulative effects of the Proposed Action.

3.8.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017, and NGS retirement activities and KM closure and final reclamation would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.

3.8.4.1.1 Colorado River Surface Water

Water Supply

When the NGS ceases to operate, the water requirements at the plant would be reduced to less than 1,500 AFA, which would be used for dust control during retirement. This is 5 to 10 percent of the amount that the NGS has historically used for cooling water and other purposes from Lake Powell. After demolition and earthmoving activities are completed, SRP water withdrawals from Lake Powell would cease.

Reducing NGS withdrawals from Lake Powell would result in a slight increase in storage volume and surface area. Compared to the historical maximum withdrawal of about 29,000 AFA and minimum historical storage of 9.8 MAF in Lake Powell in 2005, the increase in storage would be about 0.3 percent, and the surface area would increase by a lesser fraction. With greater storage levels or lesser withdrawals, the increases in volume and surface area from reducing NGS withdrawals would be a smaller relative amount.

Water Rights

As described in Section 3.8.3.1, water use at the NGS is subject to the 1969 Water Service Contract with Reclamation and water rights certificates issued by ADWR. When water use declines and ceases at the NGS, the rights to use water under the 1969 Water Service Contract would cease, and the water rights certificates would revert to ADWR for administrative action by ADWR, and the water would continue to be for other future uses and would be subject to any of the Nation’s claims.

3.8.4.1.2 NGS Perched Water

Ceasing NGS operations would eliminate water leakage from plant processes. The quantity and areal extent of perched water from leakage would stabilize and then begin to be reduced by the pumping of remediation wells. SRP plans to increase pumping until it is no longer effective in reducing the amount of perched water present, as evidenced by ongoing monitoring. The pumped water would be discharged into one or more of the remaining lined NGS ponds; water would be evaporated leaving dry salts. The ponds eventually would be closed and capped in place, essentially the same as described in the Retirement Actions, Section 2.4.4.1.

3.8.4.1.3 N-Aquifer beneath the NGS

SRP would work with the Nation to obtain an access agreement to allow for CCR monitoring. If access is granted, water quality in the N-Aquifer beneath the NGS would continue to be monitored for 30 years or more, until the appropriate closure documentation is provided to EPA pursuant to the CCR regulations (see Appendix B of NGS O&M Plan [SRP 2017d]). No degradation of water quality in the N-Aquifer is anticipated based on historical monitoring results. If degradation were to occur, remediation actions

would be taken. Additional details on closure and monitoring of the landfills (including preparation of a Landfill Closure Plan), timing, monitoring, and groundwater protection are provided in Appendix B of the NGS O&M Plan (SRP 2017d) and would essentially be the same as described in the Retirement Actions, Section 2.4.4.1.

3.8.4.1.4 KM Washes and Ponds

The KM EA (OSMRE 2017) concluded that impacts on surface water quantity or quality in local washes and channels from the sediment ponds or any existing seeps would be "negligible to minor." Surface water sedimentation ponds existing as of August 31, 2017, would remain in place until reclamation activities are completed and vegetation becomes established. During reclamation, PWCC would continue to operate under the terms and conditions of the NPDES permit, including compliance with the Seepage Management Plan, and would request modifications of the permit to allow removal of eligible temporary ponds under Western Alkaline Coal Mining regulations (40 CFR Part 434).

3.8.4.1.5 KM Springs

Impacts on shallow groundwater aquifers and the N-Aquifer were determined to be "negligible to minor" in the KM EA (OSMRE 2017); therefore, as described in the subsections on the Wepo Formation and N-Aquifer and D-Aquifer in Section 3.8.4.1.6 below, impacts on springs in the KM Permit Area would also be "negligible to minor."

3.8.4.1.6 KM Aquifers

N-Aquifer and D-Aquifer

As provided in the KM EA (OSMRE 2017), withdrawals from the N-Aquifer would be reduced from an annual average rate of 1,200 AF to about 500 AF to support reclamation activities for a 3-year period, and further reduced to 100 AFA for a 10-year period thereafter. The reduced pumping rate during reclamation would result in water levels recovering more quickly in the vicinity of the PWCC well field. The potential for leakage from the D-Aquifer into the N-Aquifer was determined to be "negligible" in the KM EA (OSMRE 2017).

Wepo Formation

The KM EA (OSMRE 2017) concluded potential impacts on Wepo Formation shallow aquifers would be "negligible to minor" since groundwater quantity and quality impacts on the shallow aquifers as a result of mining at the KM to date have been negligible. 30 CFR Part 780.21 requires PWCC to develop a hydrologic reclamation plan for protecting the hydrologic balance.

Alluvial Aquifers

Because OSMRE determined in the KM EA that impacts on surface water and groundwater resources would be "negligible to minor" as described above, impacts on alluvial aquifers would also be "negligible to minor" (OSMRE 2017).

3.8.4.1.7 Drainages under STS and WTS

If the transmission systems are retired because no extended ROW is available, short-term unmeasurable effects on water quantity and quality in the ephemeral washes could occur as the towers, lines, and foundations are removed. Backfilling, contouring, and reseeding the disturbed areas would minimize future erosion. Continued operation of the STS and WTS on Navajo Tribal Trust Lands would not have measurable effects on water resources as described in Section 3.8.4.2.7.

3.8.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019, and then retired. The existing STS and WTS would continue to be

operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. Impacts from these operations and retirement are discussed in the following sections.

3.8.4.2.1 Colorado River Surface Water

Water Supply

Compared to the No Action alternative, the effect of 2 years of continued NGS operation would increase the amount of NGS water supply withdrawals. Withdrawals by the NGS for water supply in 2018 and 2019 would be expected to range from about 19,000 to 22,000 AFA but could be up to about 29,000 AFA if maximum generation occurs (Section 2.4.2), which would result in a slight decrease in storage volume and surface area compared to the No Action alternative. Using the historical maximum withdrawal of about 29,000 AFA and minimum historical storage of 9.8 MAF in Lake Powell in 2005, the decrease in storage would be about 0.3 percent, and the surface area would decrease by a lesser fraction. With lesser withdrawal rates or greater storage levels, the relative decrease in volume and surface area would smaller.

After 2019, the effects on Lake Powell would be the same as for the No Action alternative described in Section 3.8.4.1.1 except that withdrawals of up to 1,500 AFA for NGS retirement would continue through 2024.

Water Rights

Compared to the No Action alternative, the effect of 2 years of continued NGS operation would have no effect on water rights. The NGS has rights to use water for full operation from Lake Powell through at least 2032 (Section 3.8.3.1.2). When water use declines and ceases at the NGS, the rights to use water under the 1969 Water Service Contract and water rights certificates would revert to administration by ADWR and would be subject to the Nation's claims, as indicated in Section 3.8.4.1.1.

3.8.4.2.2 NGS Perched Water

During continued operations, leakage from NGS plant processes could result in a small amount of additional perched water. Once NGS operations cease, leakage would also cease, and the quantity and areal extent of perched water from leakage would stabilize and then begin to be reduced by the pumping of remedial wells. Remedial pumping would increase and continue until it is no longer effective in reducing the amount of perched water present, as evidenced by ongoing monitoring. The pumped water would be discharged into one or more of the remaining lined NGS ponds, and water would be evaporated leaving dry salts. The ponds would eventually would be closed and capped in place (SRP 2017d).

Compared to the No Action alternative, the effect of 2 years of continued NGS operation may require up to a year or two of additional remedial pumping to remove any increase in perched water.

3.8.4.2.3 N-Aquifer beneath the NGS

No degradation of water quality in the N-Aquifer from the Proposed Action of 2 years of continued NGS operation would be expected relative to the No Action alternative because there have been no long-term effects detected historically. Water quality in the N-Aquifer below the NGS would continue to be monitored for 30 years or more, and appropriate documentation would continue to be provided to EPA pursuant to the CCR regulations (see Appendix B of NGS O&M Plan [SRP 2017d]). Pursuant to the Extension Lease, SRP would also monitor the N-Aquifer for leakage from the solid waste landfill. If degradation were to occur, remediation actions would be taken. Additional details on closure and monitoring of the landfills (including preparation of a Landfill Closure Plan), timing, deed restriction, monitoring, remediation, and groundwater protection are provided in Appendix B of the NGS O&M Plan (SRP 2017d), Retirement Guidelines (SRP 2017c), and Extension Lease.

3.8.4.2.4 KM Washes and Ponds

The KM EA (OSMRE 2017) concluded mining and reclamation activities, surface water diversions, and the construction of temporary and permanent sediment impoundments would have "negligible to minor" short-term impacts on surface water quality and quantity. This is because of the need for PWCC to meet OSMRE and tribal water quality standards in the Permit Area. Impacts on downstream water quantity beyond the Permit Area would also be negligible, resulting in an increase in potential runoff loss in the Dinnebito Wash Basin of less than 1 percent, and a decrease in potential runoff loss in the Moenkopi Wash Basin of less than 1 percent as of December 2019 (OSMRE 2017). The long-term effect of permanent impoundments left in the post-mining landscape would be negligible because the volume of water retained or detained by the permanent impoundments would be a small proportion of average annual runoff in the affected watersheds (OSMRE 2017).

Appendix F and Table 4.7.1 in the KM EA (OSMRE 2017) describe the groundwater modeling results for streams affected by PWCC pumping (the results for the cumulative effects of PWCC and community pumping are described in Section 3.8.5.6 below). The streams most impacted by PWCC groundwater pumping would be Moenkopi Wash, Dinnebito Wash, Oraibi Wash, Polacca Wash, Jeddito Wash, and Begashibito Wash. PWCC pumping had less than 0.1 percent impact on all of these washes in 2015, except for Begashibito Wash, where the PWCC pumping reduced total flow by 0.16 percent. In 2025 and 2038, the same drainages would be affected by a reduction in groundwater discharge, with Begashibito Wash showing the greatest reduction in discharge. According to Appendix F in the KM DEA (OSMRE 2017), a long time (decades) would be required for the effects of reduced PWCC pumping to affect streamflows because of the distance to the areas of groundwater discharge into the streams and because the streams are located in the unconfined area. PWCC pumping would account for about 0.5 percent reduction in Begashibito Wash total flow in 2025 and about 0.9 percent in 2038.

3.8.4.2.5 KM Springs

The KM EA (OSMRE 2017) concluded impacts on shallow groundwater aquifers would be "negligible to minor" (OSMRE 2017); therefore, as described in the subsection on the Wepo Formation below, impacts on springs from that formation in the KM Permit Area also would be "negligible to minor."

3.8.4.2.6 KM Aquifers

N-Aquifer and D-Aquifer

Based on Section 4.7.1.2 and Appendix F of the KM EA (OSMRE 2017), groundwater pumping from the N-Aquifer for mine uses would continue at an estimated rate of 1,200 AFA until mining ceases in 2019. Beginning in 2020, the annual pumping and impacts would be the same as those described for the NGS No Action alternative in Section 3.8.4.1.6 above. Groundwater modeling of the effects of pumping from the KM wellfield predicts that water levels in the N-Aquifer would continue to recover from 2005 elevations near the KM Permit Area through 2019 and then recover at an increasing rate once mining ceases in 2019.[27] Water level recovery in the vicinity of the KM is already estimated to be greater than 20 feet, although drawdown continues. Some leakage to the N-Aquifer would continue to occur from the D-Aquifer, but the effect on N-Aquifer water quality would be "negligible to minor" according to the KM EA (OSMRE 2017).

Wepo Formation

As provided in the KM EA (OSMRE 2017), it is likely that there would be some minimal impact on local groundwater levels in the Wepo Formation and adjacent alluvial aquifers during continued mining into

[27] In 2005, PWCC ceased pumping to slurry coal from the Black Mesa Mine to the Mohave Generating Station, which reduced pumping by about 75 percent (OSMRE 2017).

2019. Changes in Wepo water levels due to mine dewatering would be long-term but limited to the local vicinity of the mine pit, resulting in "minor" impacts on the use of the shallow groundwater system within the Permit Area. Potential impacts on shallow aquifer water levels and water quantity would also be "minor but long-term and limited to the Permit Area."

Alluvial Aquifers

The KM EA (OSMRE 2017) concluded that reduced flows in washes could decrease the amount of recharge to alluvial aquifers; however, the impoundment of runoff water and subsequent seepage of sediment pond water could locally enhance recharge. According to the KM EA (OSMRE 2017), any reduction in recharge would be immeasurable, and there would be negligible impact on the quantity of recharge to the alluvial aquifers from mining activity. The KM EA (OSMRE 2017) concluded potential effects from acid-forming materials on groundwater quality would be expected to be "minor" due to the high carbonate content of the soils and limited to the Permit Area.

3.8.4.2.7 Drainages under STS and WTS

On-the-ground transmission O&M activities are limited to periodic inspections, line and tower repairs, maintenance of access routes, and vegetation treatments (SRP 2017d). All of these activities avoid ephemeral washes and intermittent streams, especially when they are wet or flowing. Given the limited operation and maintenance activities involving the transmission lines and use of BMPs as described in the NGS O&M Plan (SRP 2017d), no measurable effects on water quantity and quality would occur from the Proposed Action. Short-term unmeasurable effects would occur when the transmission systems and communication facilities are ultimately retired as described in Section 3.8.4.1.7 for that scenario.

3.8.5 Cumulative Effects

Cumulative impacts are based on considerations of past, present, and reasonably foreseeable future actions and their potential effects on water resources in combination with the Proposed Action. As described in Section 3.2, these other actions include:

- The Glen Canyon Dam Long-Term Experimental and Management Plan (Glen Canyon LTEMP);
- The proposed Lake Powell Pipeline Project in Utah;
- The Navajo-Gallup Pipeline Project in New Mexico;
- Continued water diversions and depletions from the San Juan River by the Four Corners and San Juan power plants;
- Past and current NGS operations;
- Past, present, and future N-Aquifer pumping by Navajo and Hopi communities, including the Manymules Water Project and the Hopi Arsenic Mitigation Project;
- Historical mining, reclamation, and N-Aquifer pumping by PWCC;
- Ranching and agriculture in and near the KM Permit Area; and
- Tribal surface water diversions and retention structures for livestock watering and agricultural production downstream from Black Mesa.

3.8.5.1 Colorado River Surface Water

3.8.5.1.1 Water Supply

Past impacts of the NGS and other depletions on the Lake Powell water supply are part of the baseline conditions evaluated under the Proposed Action. The combined effect of the present and reasonably foreseeable future actions would have a negligible effect on the water quantity or quality in Lake Powell for the reasons listed in the following paragraphs.

The first year of the 20-year Glen Canyon LTEMP is 2017, but the changes in water releases only affect the seasonal distribution of water levels in the reservoir through hourly, daily, and monthly release patterns. There would be no annual net effect on Lake Powell; thus, no cumulative effects would occur from year to year.

The proposed Lake Powell Pipeline Project in Utah is not expected to be completed and withdraw water before 2025; thus, no cumulative effects on Lake Powell water levels or water quality would occur.

As described in Section 3.1.2.1, the Navajo-Gallup Pipeline is currently under construction and scheduled to begin delivering water by 2024. It will divert water from the San Juan River for use outside of the Lake Powell watershed area under an exchange for Navajo Lake storage. The diversions will be offset by releases of water stored in Navajo Lake with an estimated average return flow of approximately 1,870 AFA to the San Juan River. Given the timing of the project and no net depletions to San Juan River flow, cumulative effects on Lake Powell water levels or water quality would not occur.

Future surface water diversions and depletions from the San Juan River by the Four Corners and San Juan power plants would continue to have an effect on Lake Powell water supply. Each of those plants would have an effect of similar magnitude as the NGS. Thus, the cumulative effects are anticipated to be less than one percent for the 2 years of continued NGS operation under the Proposed Action.

3.8.5.1.2 Water Rights

None of the past, present, and reasonably foreseeable future actions would have any effect on future water rights to Arizona's share of the Upper Colorado River; thus, no cumulative effects from the Proposed Action would occur.

3.8.5.2 NGS Perched Water

None of the past, present, and reasonably foreseeable future actions would have any effect on perched water beneath the NGS; thus, no cumulative effects from the Proposed Action would occur.

3.8.5.3 N-Aquifer beneath the NGS

As with perched water beneath the NGS, none of the past, present, and reasonably foreseeable future actions would have any effect on the N-Aquifer beneath the NGS; thus, no cumulative effects would occur from the Proposed Action.

3.8.5.4 KM Washes, Ponds, and Springs

Past, present, and reasonably foreseeable ranching and agricultural activities have slight, unmeasurable impacts on water quantity and quality in the washes and ponds in and near the KM Permit Area. Thus, adding the effects of mining for 2 more years would result in negligible effects.

The KM EA determined that past, present, and reasonably foreseeable future impacts on surface water quantity and quality in Wepo Formation springs from PWCC mining and reclamation would be very small and unmeasurable. Adding the effects from continued mining under the Proposed Action would result in negligible cumulative effects on Wepo Formation springs (OSMRE 2017).

Cumulative effects on N-Aquifer springs are discussed below under N-Aquifer and D-Aquifer in Section 3.8.5.5.

3.8.5.5 KM Aquifers

3.8.5.5.1 N-Aquifer and D-Aquifer

As provided in the KM EA (OSMRE 2017), the cumulative impact of PWCC activities to 2032 would be "minor to moderate" in the Black Mesa Basin because the rebound of water levels in the N-Aquifer due to reduced PWCC water use would be offset by increased Navajo and Hopi community pumping, including the Manymules Water Project under development and Hopi Arsenic Mitigation Project currently in the beginning stages of development.

3.8.5.6 Drainages under the STS and WTS

None of the past, present, and reasonably foreseeable future actions would have any effect on water quantity or quality in drainages under the transmission lines on Navajo Tribal Trust Lands; thus, no cumulative effects from the Proposed Action would occur.

3.9 Special Status Species

This section describes the affected environment and environmental consequences for terrestrial and aquatic special status plants and animals in the analysis areas potentially affected by various components of the proposed NGS Extension Lease. The analysis areas and regulatory framework are presented first, followed by descriptions of the affected environment. This section concludes with environmental consequences describing the direct and indirect effects of the Proposed Action and No Action alternatives, followed by cumulative effects. As summarized in Section 3.1.1, because the KM has already undergone environmental compliance with OSMRE, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017) and KM BA (Stantec 2017).[28]

Special status species include federally listed (threatened or endangered), proposed, and candidate species and Navajo Endangered Species List Group 2 (G2) or Group 3 (G3) (Endangered) species. Laws, regulations, and policies that directly influence special status management decisions for the project primarily are implemented by the U.S. Fish and Wildlife Service (USFWS), Nation, and Arizona Game and Fish Department (AGFD). Laws, regulations, directives, and agreements relevant to special status species and the proposed project are also discussed in Chapter 4 of this EA.

3.9.1 Regulatory Framework

Federally threatened and endangered species are protected under the Endangered Species Act (ESA) of 1973, as amended (16 USC 1531 et seq.). The ESA requires federal agencies to ensure that any action they approve is not likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of critical habitat. Agencies are also required to support and carry out conservation programs for these species. Potential effects on a federally listed species or its designated critical habitat resulting from a project with a federal action require the federal action agency to consult with USFWS under Section 7 of the ESA.

Wildlife determined to be endangered within the Nation are protected under Navajo Nation Code, Title 17 §507. Take, possession, transport, export, processing, selling, or offer to sell or ship any species on the Navajo Endangered Species List is prohibited under Title 17 §507(C)(1). Although the NGS, STS, and WTS are not subject to Navajo regulations under the Existing or proposed Extension Leases, effects on these wildlife species are considered in this EA.

3.9.2 Analysis Areas

The overall analysis area for special status plant, animal, and fish species consists of (1) areas potentially directly impacted by NGS, STS, and WTS operations and retirement activities; (2) areas potentially indirectly impacted by KM operations and retirement activities; (3) areas that may be indirectly impacted by NGS stack emissions; and (4) areas that may be indirectly affected by KM-associated groundwater pumping from the N-Aquifer. In support of the KM EA (OSMRE 2017), Ramboll Environ (2016f) evaluated the potential indirect effects of fugitive dust generated by the KM and concluded that the contribution of KM emissions would be negligible when added to NGS emissions; therefore, indirect effects of KM emissions are not discussed further in this section of this EA.

[28] On September 19, 2017, FWS concurred with OSMRE's determination that the action "may affect but is not likely to adversely affect" a number of listed species described in the KM BA, pursuant to Section 7 of the ESA (FWS Letter AESO/SE 02EAAZ00-2016-I-0614).

The cumulative effects analysis areas are the same as described for direct and indirect effects for surface, light, noise, and groundwater pumping impacts on special status plant, animal, and fish species. The analysis area for cumulative emissions effects is described below in Section 3.9.6.

3.9.2.1 Direct Disturbance Effects Analysis Areas

The analysis area for direct disturbance impacts from the Extension Lease on special status species is the NGS and associated facilities and the STS and WTS ROW corridors on Navajo Tribal Trust Lands (see Figure 13, Natural Resources Analysis Areas). The analysis area for direct effects of NGS withdrawals from Lake Powell on special status species is Lake Powell. The analysis area for indirect impacts from KM operations and retirement on special status species is the KM Permit Area described in the KM EA Section 3.8 and Section 3.9 and shown on Figure 13.

3.9.2.2 Direct Emissions Effects Analysis Areas

The potential impacts of NGS emissions and deposition through December 2019 were previously analyzed in the KM EA and BA for the KM 5-year permit renewal. Two ERAs were conducted in support of the Five Year Permit Renewal Environmental Assessment and the associated BA to evaluate the potential for adverse effects of NGS emissions and the resulting deposition of chemicals on ecological receptors in Lake Powell (NGS Near-Field ERA, Ramboll Environ 2016f) and the Colorado River (Colorado River ERA, Ramboll Environ 2016a). Air emission modeling was conducted to determine the deposition areas for the NGS and KM operations. Details for the air emission modeling are provided in Sections 3.3 and 3.4 (Air Quality and Climate). A separate air emission fate and transport study was conducted by the Electric Power Research Institute (EPRI) to assess the impact of regional coal-fired power plants (i.e., the NGS, Four Corners Power Plant [FCPP], and San Juan Generating Station) emissions of mercury, selenium, and arsenic on federally endangered fish in the San Juan River, and to provide quantitative data necessary to estimate the impacts of other local, regional, and long-range (global) contributions (EPRI 2016). Field sampling to establish baseline (existing) conditions for soil, sediment, and water quality was conducted in the defined Near-Field study area that included areas of Lake Powell and the Colorado River below Glen Canyon Dam (Ramboll Environ 2016g). These data were used to support the ERAs.

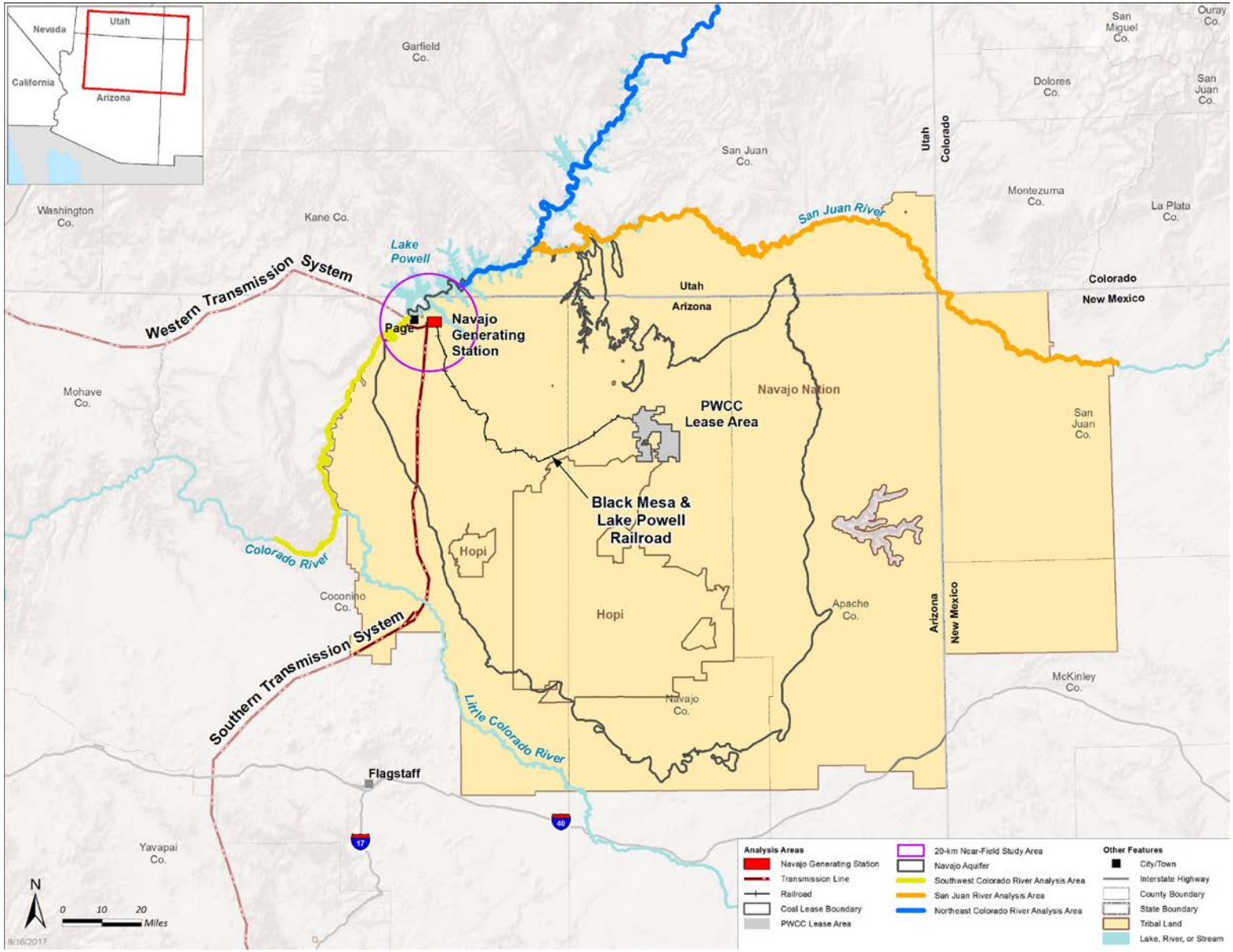

Figure 13. Natural Resources Analysis Area.

The ERAs conducted included:

- **NGS Near-Field ERA:** The NGS Near-Field ERA evaluated existing conditions and potential future environmental conditions in the vicinity of the NGS (Ramboll Environ 2016f). The ERA was conducted to specifically evaluate the potential risk in terrestrial and aquatic environments from exposure to chemicals dispersed from stack emissions and other NGS sources within the area estimated to be above the air deposition threshold protective of terrestrial and aquatic ecological endpoints (i.e., Near-Field deposition area) as identified by air dispersion modeling with consideration of Near-Field (existing conditions) soil, sediment, and surface water quality data (Ramboll Environ 2016f).
- **Colorado River ERA:** The Colorado River ERA (Ramboll Environ 2016a) evaluated existing background (current conditions) and potential future environmental conditions in areas not specifically addressed by the Near-Field ERA and EPRI study. The Colorado River ERA evaluated aquatic and aquatic-oriented ecological receptors only, with a special focus on special status species occurring in association with the region.

Analysis areas for direct impacts of emissions were derived from the Ramboll Environ ERAs and include:

- NGS Near-Field analysis area, consisting of a 20-kilometer (km) radius from the NGS facility that overlaps a portion of Lake Powell
- Northeast (NE) Colorado River analysis area, consisting of Lake Powell beyond the NGS Near-Field analysis area and the Colorado River northeast of Lake Powell upstream to the confluence of the Colorado and Green Rivers
- Southwest (SW) Colorado River analysis area, consisting of the lower Colorado River downstream of the NGS Near-Field analysis area, from Lees Ferry to the confluence of the Colorado and Little Colorado Rivers
- San Juan River analysis area, which encompasses the San Juan River from the State Route 371 bridge in Farmington, New Mexico, downstream to the San Juan arm of Lake Powell.

The analysis area for the analysis of direct emissions effects is shown in Figure 13.

3.9.2.3 KM Groundwater Pumping Analysis Areas

Effects of KM groundwater pumping from the N-Aquifer are described in Section 3.8 and are briefly summarized in this section. The N-Aquifer analysis area occupies an area of approximately 10,400 square miles bounded on the north by the lower San Juan River, Lake Powell, and the Colorado River; on the east by Chinle Wash and Chinle Creek; and elsewhere by the outer limit of the N-Aquifer as shown on Figure 11. The analysis of impacts on baseflows in springs and seeps, stream channels, and ponds within the N-Aquifer analysis area that potentially support aquatic, wetland, and riparian habitat are discussed in Section 3.8. Figure 3.7-1 in the KM EA (OSMRE 2017) depicts the analysis area for the N-Aquifer.

3.9.2.4 Cumulative Emissions Analysis Area

For terrestrial special status species, the cumulative effects analysis area is the same as that described for the Proposed Action. The cumulative effects analysis area for emissions effects on special status fish species is expanded to include the effects of activities in the Upper Colorado River Basin and the upstream portion of the San Juan River from the State Route 371 bridge in Farmington, New Mexico, downstream to the San Juan arm of Lake Powell. The portion of the Colorado River below Glen Canyon Dam is extended downstream to the confluence of the Colorado River and the Little Colorado River.

3.9.3 Ecological Risk Assessment Methods

Federally listed wildlife and plants in terrestrial and aquatic environments could be exposed to project-related residual chemicals present in soil, water, and sediment within the analysis area under current conditions. The sources of these chemicals in environmental media may include past NGS operations; regional emission sources including but not limited to FCPP and San Juan Generating Station; municipal, industrial, and agricultural emissions and runoff; global emission sources; and naturally occurring conditions. The major constituents of potential ecological concern (COPECs) addressed for the ERAs focused on substances contained in coal that are then released via power plant stack emissions.

The ERAs evaluated both special status species (federally listed or state-listed species) and non-special status species. Representative ecological receptors that have been observed or are expected to occur locally or regionally were selected to evaluate the potential for adverse effects due to current or proposed future operation of the NGS and the KM. The biological organisms evaluated included terrestrial wildlife and soil communities (plants and soil invertebrates); aquatic-oriented wildlife; and aquatic communities (plants, invertebrates, and fish).

The Ramboll Environ ERAs (Ramboll Environ 2016a, 2016f) quantified chemical risk for representative ecological receptors selected based on ecological conceptual site models, which graphically and narratively describe the relationship between potential sources, release mechanisms (e.g., aerial deposition or wind-generated dusts), and environmental exposure to potential receptors (animals and plants). Two primary estimates of risk were developed for the ERAs under the following evaluation scenarios:

- Screening (Maximum) Evaluation – An initial evaluation that uses the maximum estimate of exposure and toxicity to return a conservative estimate of risk. This level of evaluation relies on toxicity data (benchmarks or toxicity reference values) at or below which adverse effects are not expected.
- Refined Evaluation – A subsequent evaluation where the risk estimate is developed using refined COPEC concentrations. For evaluation of special status species, toxicity data considered protective of individual organisms (indicative of a no effect level as was used in the screening evaluation) are applied per EPA guidance (EPA 1997). This step was applied to all COPEC/receptor combinations to illustrate the range of potential risk.

All COPECs were retained throughout the screening and refinement steps to present the range of estimated risk for all exposure scenarios (using average, refined, and maximum COPEC concentrations) and to ensure that no COPEC/receptor combination was prematurely eliminated from consideration before all exposure and temporal scenarios had been evaluated. The outcome of the refined evaluation represents a scientific management decision point in which the conclusion of acceptable or unacceptable ecological risk is used to guide risk management decisions or define additional data needs to further characterize risk (EPA 1997).

EPRI conducted a watershed-scale assessment of trace metal deposition and dynamics within the San Juan River watershed resultant from emissions of arsenic, mercury, and selenium from three regional power plants (the NGS, FCPP, and San Juan Generating Station). The methods used to develop the models are summarized in the EPRI report (EPRI 2016). The San Juan Study covers the period affected by the Extension Lease; therefore, the data are appropriate to include in this analysis. Atmospheric deposition was simulated for multiple potential scenarios of emissions from local coal-fired power plants as well as regional (U.S.) and global sources of mercury beyond the bounds of the San Juan River Basin. Data from the EPRI assessment were used to support the ERAs.

3.9.3.1 Estimation of Risk

The exposure assessment presents the assumptions and parameters used to develop estimates of exposure. Per EPA guidance (EPA 1997, 1998), the ERA is an evaluation based on conservative assumptions and is intended to eliminate COPECs with no potential to cause risk and identify those that require further evaluation. The refined evaluation allows for refinement of COPECs identified in the initial screening (EPA 1997, 1998) and allows for the identification and characterization of current and future risk using site-specific assumptions regarding exposure.

The toxicity assessment evaluates available toxicity and other effects information to correlate the exposure to adverse effects. Toxicity reference values that correlate a specified effect to a given chemical concentration are used to characterize potential ecological effects. The effects data used to evaluate ecological risks resulting from chemical exposure were obtained from literature-derived single-chemical toxicity data. Toxicity data and exposure parameters used to develop risk estimates were presented in each of the ERAs developed for the KM permit renewal (Ramboll Environ 2016a, 2016f). The toxicity reference values (TRVs) and media-based benchmarks (for soil, water, sediment, and fish tissue) used are implicitly protective of a range of adverse effects that may impact individual organisms and the maintenance of organism populations or communities. They are based on reproductive, survival, and growth effect endpoints that may result from chronic exposure, including relatively short-term exposure during sensitive life stages (e.g., breeding).

Risk characterization is the estimation and description of risk based on the exposure and toxicity assessment, and also considers the uncertainties associated with the estimation and description of risk (EPA 1997, 1998). Risk estimation uses quantitative methods to evaluate the potential for risk, which can be presented as screening level hazard quotients (HQs) (where maximum COPEC concentrations are used) and refined HQs (where the 95 percent upper confidence limit [UCL] and average COPEC concentrations are used). For screening and refined evaluations, risk estimates are derived for each representative ecological receptor using the defined measures of exposure (receptor-specific exposure parameters and/or medium-specific exposure point concentrations) and effect (chemical-specific TRV) for each defined exposure scenario.

The quantitative risk estimates provided in the ERAs for this project are intended to identify instances where COPEC exposure exceeds an applicable threshold, below which adverse effects on individual receptors are unlikely to occur. The HQs are ratios calculated by dividing the receptor's estimated exposure by a comparable toxicity benchmark or TRV expressed in the same units of measure:

- For receptors evaluated on a community-level basis, COPEC concentration in the environment (soil, sediment, water, and fish tissue exposure point concentration) is compared to a media-based toxicity benchmark:

$$HQ = \frac{\textit{Exposure Point Concentration}}{\textit{Toxicity Benchmark}}$$

- For wildlife (birds and mammals), estimated daily dietary dose is compared to a TRV:

$$HQ = \frac{\textit{Dietary Dose}}{\textit{Toxicity Reference Value}}$$

The HQ is not a predictor of risk, but rather is an index used to eliminate potential risk and to identify chemicals for which additional evaluation may be required (Allard et al. 2009; EPA 1997). It is important to recognize that the magnitude of the HQ is not comparable across or within receptor groups (i.e., a HQ of 10 for one receptor is not necessarily "worse" than a HQ of 5 for another), as the underlying dose-response relationship may not be linear or comparable between representative species (Allard et al. 2009).

For the evaluation of special status species, particularly federally listed species, the HQ is generally interpreted as follows:

- HQ ≤ 1
    - Ecological risk is unlikely or absent
    - No adverse effects anticipated as a result of exposure; no further concerns
- HQ > 1
    - Ecological risk may be present
    - Proceed to risk management and/or consider additional lines of evidence or studies to further refine risk estimates to limit uncertainties in the risk estimate

Key exposure assumptions and toxicity data used are described in the Ramboll Environ ERAs (2016a, 2016f).

3.9.3.2 Baseline Conditions

Baseline conditions, both within the NGS lease area and within the Near-Field analysis area, were determined through the development of Supplemental Information Reports (Ramboll Environ 2016a, 2016f). These reports describe the baseline constituent concentrations of metals (arsenic, mercury, methylmercury, and selenium) and organics, and baseline measurements of other water quality parameters (e.g., pH and total organic carbon) in the soil and water in each analysis area. The Ramboll Environ ERAs (Ramboll Environ 2016a, 2016f) relied on baseline information from the Supplemental Information Reports. Following is a brief summary of baseline conditions.

In the NGS lease area:

- Key constituents at low concentrations are dispersed through the NGS lease area with no distinct patterns of occurrence.
- Arsenic is a naturally occurring constituent and is widely distributed at low concentrations.
- Selenium, while naturally occurring, is not detected in surface soil and rarely detected in sediment and surface water. Where detected, it occurs in low concentrations.
- Total mercury is widely distributed across the NGS lease area at low concentrations.
- Methylmercury and organics are infrequently detected.

In the NGS Near-Field analysis area:

- Key constituents are detected at low concentrations and are dispersed throughout the Near-Field area with no distinct patterns of occurrence.
- Selenium, while also naturally occurring, is infrequently detected in all media. Where selenium is detected, the concentrations are low.
- Arsenic is a naturally occurring constituent and, as expected, is widely distributed across the Near-Field analysis area at low concentrations.
- Similarly, total mercury, methylmercury, and organics are infrequently detected among all media where analyzed.

3.9.4 Affected Environment

The following subsections describe federally listed, candidate, and proposed terrestrial wildlife, aquatic, and plant species, and their habitat in the analysis areas, followed by a description of Navajo Nation Endangered (NNE) species not federally listed but potentially occurring in the analysis areas.

3.9.4.1 Federally Listed, Candidate, and Proposed Terrestrial Wildlife Species

Federally listed terrestrial species potentially occurring in the analysis areas are shown in Table 24. The affected environment for these species is described below. No proposed or candidate terrestrial species occur in the overall analysis area.

Table 24. Federally Listed Terrestrial Species Potentially Occurring in the Analysis Areas.

Common Name	Scientific Name	Federal Status[1]	Potential Occurrence in Analysis Areas[2,3]
California condor	*Gymnogyps californianus*	NE	K - NGS, NF, KM, STS, WTS, RR
Mexican spotted owl	*Strix occidentalis lucida*	FT	P - KM
Southwestern willow flycatcher	*Empidonax traillii extimus*	FE	K - RR, P - NF, KM, STS, WTS, RR, NE Colorado River, SW Colorado River, SJR
Western yellow-billed cuckoo	*Coccyzus americanus*	FT	K - NE Colorado River, SW Colorado River, SJR, KM, STS, WTS

[1] FT = Federal Threatened, FE = Federal Endangered, NE = experimental nonessential, Proposed Threatened.
[2] K = Known occurrence based on Natural Heritage Program data, Navajo Natural Heritage Program (NNHP) data, data from the Peregrine Fund (California Condor), and agency input (Reclamation 2016b; OSMRE 2017; USFWS 2017); P = Potential occurrence based on habitat information, agency input, and the USFWS Information, Planning, and Conservation system.
[3] NGS = NGS lease area; RR = BM&LP Railroad analysis area; STS = Southern Transmission System; WTS = Western Transmission System, NF = NGS Near-Field analysis area; NE Colorado River = Northeast Colorado River analysis area; SW Colorado River = Southwest Colorado River analysis area; SJR = San Juan River analysis area.
Source: List of threatened, endangered, and proposed species provided by USFWS (2017) and supplemented with information from Reclamation (2016b) and Stantec (2017). Note: Reclamation (2016b) used only for STS and WTS occurrence data.

Several species from the list of threatened, endangered, and proposed species provided by USFWS (2017) for the Extension Lease are not known to occur in the analysis areas and would not be affected by the existing or proposed Extension Lease for the NGS (Table 24): black-footed ferret (*Mustela nigripes*), Mexican gray wolf (*Canis lupus bayleyi*), Utah prairie dog (*Cynomys parvidens*), Gunnison sage grouse (*Centrocercus minimus*), and northern Mexican garter snake (*Thamnophis eques megalops*). Because these species are not known to occur in the analysis area or would not be affected by the Proposed Action, they are not discussed further in this EA. The affected environment for the remaining species listed in Table 24 is summarized below, based on information provided in the KM EA (OSMRE 2017), KM BA (Stantec 2017), and NGS-KMC DEIS (Reclamation 2016b[29]).

3.9.4.1.1 California Condor

The California condor (*Gymnogyps californianus*) was federally listed as an endangered species under the ESA in 1975. It is listed as a G4 endangered species by the Nation. The California condor is designated as a nonessential experimental population in northern Arizona and southern Utah. The reintroduced population in Arizona is managed as a threatened species outside the reintroduction area. Primary threats to this species are lead poisoning, predation, starvation, and shooting. From 1992 to 2012, there was only one recorded incident of powerline-related mortality (USFWS 2013a). As of December 31, 2015, the wild population totaled 268 individuals (155 in California, 80 in Arizona/Utah, and 33 in Baja, Mexico) (USFWS 2015a).

California condors are opportunistic scavengers that feed only on carrion. Condors rely primarily on sight and not smell to locate carrion; 95 percent of their diet consists of cattle, domestic sheep, ground

[29] Reclamation (2016b) was used only for species occurrence data and habitat descriptions in the STS and WTS analysis area.

squirrels, mule deer, and horses (USFWS 2013a). Condors are social feeders with typical foraging behavior consisting of long-distance reconnaissance flights, circle-soaring over a carcass, and hours of waiting at roosts or on the ground near a carcass (USFWS 1996).

California condors have an expansive home range and are capable of traveling from 50 to more than 100 miles in a single day. Condors require open habitat for soaring and easily locating feeding opportunities. Condors do not build nests; rather, they move sand, branches, rocks, and other materials around in nest sites to produce an appropriate substrate needed for egg laying (USFWS 2013a). Breeding habitat typically is located in steep remote mountainous or canyon terrain on rock or cliff escarpments at low to moderate elevations.

Condor habitat must support large mammals, which provide a source of carrion. Foraging habitats consist of open grasslands, shrublands, and pinyon-juniper woodlands that support populations of deer, elk, and cattle. Condors require large foraging areas because feeding opportunities are limited and often widely distributed across their range. Roosts, found in or near both foraging and nesting habitat areas, typically consist of large trees or snags with open lateral branches or cliff faces and rock spires with available perches. Because they are such large birds, condors typically select roosting sites near cliffs where updrafts provide adequate lift for them to take flight (AGFD 2015a; American Ornithologists' Union [AOU] 2004; Snyder and Rea 1998; USFWS 1996).

In the vicinity of the analysis areas, condors are part of the "Southwest population" of condors, a designated nonessential experimental population. For the purposes of Section 7 of the ESA, condors in this population are treated as a proposed species except within national parks and national wildlife refuges, where they are treated as a threatened species. Critical habitat is not present within the area occupied by the Southwest population.

Telemetry data indicate that California condors occasionally fly by the NGS, but the majority of condor activity occurs in and around Vermilion Cliffs National Monument (where a release site is located), Grand Canyon and Zion National Parks, the Kaibab Plateau, and, to a lesser extent, Marble Canyon (Parish 2013, 2014). Condors occurring in the easternmost portion of Vermilion Cliffs National Monument and along the Colorado River from Glen Canyon Dam downstream to the confluence of the Paria River are within the radius of the NGS Near-Field emissions deposition area and the WTS corridor. Telemetry data show California condors occasionally traversing the railroad and STS ROW corridors, but the relative lack of telemetry data near the railroad suggests these individuals were on foraging flights and not nesting in the area. California condors have not been recorded in the KM Permit Area (Nation 2016; Hopi Tribe 2016, as cited in OSMRE 2017).

3.9.4.1.2 Mexican Spotted Owl

The Mexican spotted owl (*Strix occidentalis lucida*) is federally listed as a threatened species and listed as a G3 endangered species by the Nation. Mexican spotted owl critical habitat was designated in 2004 (69 FR 53182).

The Mexican spotted owl is a permanent resident in the interior mountain ranges of western North America, ranging from southern Utah and central Colorado south through the mountains of Arizona, New Mexico, and west Texas. The species typically occupies old-growth forest in mixed conifer, pine-oak woodland, deciduous riparian forest, or a combination of these habitats that will support a home range of 1,400 to 4,500 acres (Ehrlich et al. 1988; Gutierrez et al. 1995). An undisturbed core area, or protected activity center (PAC), of approximately 600 acres centered on the nest site is the currently recommended disturbance buffer (Gutierrez et al. 1995).

Mexican spotted owls have been reported at elevations ranging from 3,700 feet above mean sea level (amsl) to the subalpine transition zone (Ganey et al. 1998; Gutierrez et al. 1995; Johnsgard 1988). The

species typically inhabits steep canyons with mature or old-growth forest, but they also may occur in canyons with steep cliffs and relatively little forest habitat. Mexican spotted owl habitat typically has a structured canopy, a perennial water source, and a rodent-dominated prey base of adequate size (Gutierrez et al. 1995). The Mexican spotted owl diet varies with geography (Ward and Block 1995).

Mexican spotted owls exhibit high nest fidelity and construct nests in rock crevices, in tree cavities (usually in live trees), or on constructed platforms on tree limbs. In northern Arizona, owls have been reported in both canyon and montane forest situations (USFWS 2012a). Mexican spotted owls also will use abandoned raptor or corvid platform nests (Ehrlich et al. 1988; Terres 1980). Threats to this species include altered forest structure, grazing by domestic and wild ungulates when it reduces prey habitat, noise disturbance, and climate change (USFWS 2012a).

Mexican spotted owl critical and suitable habitat in the analysis areas is depicted on KM BA Figure 6-1. Thirteen years ago, the Mexican spotted owl was considered a year-round resident of the northeastern part of Black Mesa (BIOME 2003) where individuals had been observed within 2 miles of the northeastern boundary of the KM Permit Area; no nesting records occurred within the KM Permit Area. The species was documented and PACs were designated in the upper Yellow Water Canyon, the side canyons of Coal Mine Wash, and upper Moenkopi Wash (BIOME 2003). The upper northeastern portion of the KM Permit Area overlaps one of these PACs. Mexican spotted owl surveys conducted in 1999 detected six unpaired male owls and one breeding pair, the latter of which was observed in upper Coal Mine Wash (OSMRE 2017). From 2000 and 2010, no spotted owl surveys were conducted because no mine-related activity occurred near the PACs. With implementation of mining activities in coal resource area N-9, Mexican spotted owl surveys resumed close to this resource area in 2011 and have been conducted annually since then. From 2011 to 2014, no Mexican spotted owls were documented during these survey efforts (EMI 2015). In 2015, there were two Mexican spotted owl detections within approximately 1.9 miles of coal resource area N-9 (EMI 2016). These detections are thought to have been of the same individual due to their close temporal and spatial proximity. A follow-up visit the next morning yielded no further detections of the bird(s), and a nest could not be located.

3.9.4.1.3 Southwestern Willow Flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus*) is federally listed as an endangered species and is listed by the Nation as a G2 endangered species. Critical habitat was designated in 1997 and revised in 2013.

The southwestern willow flycatcher is a Neotropical migratory bird species that breeds in the southwest U.S. and winters in the rainforests of Mexico, Central America, and northern South America. The breeding season diet of southwestern willow flycatchers is almost exclusively insectivorous. Foraging is done primarily by sallying from a perch to perform aerial hawking and gleaning. Foraging frequently takes place at edges and openings with a habitat patch, or at the top of the upper canopy (Sogge et al. 2010).

The southwestern willow flycatcher is considered a riparian obligate species during the breeding season. Four specific types of riparian communities have been described as southwestern willow flycatcher breeding habitat. The first consists of dense stands of willows 10 to 23 feet high with no distinct overstory. This community is often associated with sedges, rushes, or other herbaceous wetland plants. A second habitat type includes dense stands of salt cedar (*Tamarix* spp.) or Russian olive (*Elaeagnus angustifolia*), up to 33 feet high. These species form a dense closed canopy with no distinct understory layer. Native broadleaf-dominated communities form a third habitat type, and the fourth habitat type is a mixture of native and exotic riparian species (Sogge et al. 2010).

The most critical threats to the flycatcher are extensive loss, fragmentation, and modification of riparian breeding habitat with consequent reductions in population levels (USFWS 2002a). This species is also affected directly by factors that impact their survival and reproductive success such as brood parasitism.

No critical habitat is present in or adjacent to the analysis areas. Riparian woodland and scrubland vegetation communities in the analysis areas provide potentially suitable southwestern willow flycatcher habitat and occur largely in patches along the Colorado River, the San Juan River, and associated tributaries. Scattered riparian patches also occur throughout the NGS, KM, STS, and WTS analysis areas.

Within the NGS Near-Field analysis area, there are documented occurrences of southwestern willow flycatchers along the Colorado River both upstream and downstream of Glen Canyon Dam. They also have potential to occur wherever suitable riparian habitats are present in this area.

Southwestern willow flycatchers have been documented on Black Mesa during migration, but it is unknown whether these observations have been of the southwestern subspecies (BIOME 2003). Potential habitat is present in the KM Permit Area in larger blocks of riparian shrubs and trees along perennial streams, springs, and seeps in Yellow Water Canyon Wash, Moenkopi Wash, and Dinnebito Wash (BIOME 2003) (see Figure 11).

3.9.4.1.4 Western Yellow-Billed Cuckoo

The western U.S. distinct population segment of the yellow-billed cuckoo (*Coccyzus americanus*) was listed as threatened under the ESA in 2014. USFWS proposed critical habitat for the western yellow-billed cuckoo in 2014, but critical habitat has not yet been designated for this species. The Nation lists the western yellow-billed cuckoo as a G2 endangered species.

The western yellow-billed cuckoo is a Neotropical migrant that spends the winter in South America, east of the Andes Mountains and primarily south of the Amazon River Basin. In Arizona, most cuckoos do not arrive on their breeding grounds until mid-June (Corman and Wise-Gervais 2005). Nesting typically occurs between late June and late July but may begin as early as May and continue into September (Halterman et al. 2015). Western yellow-billed cuckoos typically have one brood per year (Ehrlich et al. 1988), but double broods have been regularly observed on the lower Colorado and Bill Williams Rivers (McNeil et al. 2013).

Western yellow-billed cuckoos are considered riparian obligates because they nest almost exclusively in low- to moderate-elevation riparian woodlands that are 50 acres or more, located within arid to semiarid landscapes, and contain native broadleaf trees and shrubs (Hughes 1999). The species is most commonly associated with cottonwood- and willow-dominated vegetation, but the composition of its habitat varies across its range.

Breeding sites often have a distinct overstory of willow, cottonwood, or other broadleaf trees with discernible subcanopy layers and an understory of mixed trees and shrubs, including tamarisk (Halterman et al. 2015). In Arizona, western yellow-billed cuckoos most commonly occur in cottonwood/willow/ash/mesquite habitat and least commonly occur in habitat consisting of greater than 75 percent tamarisk cover (Johnson et al. 2010). Cuckoos eat a variety of prey items with large arthropods (e.g., cicadas, katydids, grasshoppers, and caterpillars) as their primary prey. Other prey includes small lizards, frogs, spiders, tent caterpillars, and a variety of other insects (Halterman et al. 2015). Evidence suggests population levels and breeding may be closely tied to the abundance of certain food items (Halterman 2009; McNeil et al. 2013; and multiple other authors cited in Halterman et al. 2015).

Habitat loss is the primary threat to the western yellow-billed cuckoo (Corman and Wise-Gervais 2005; Floyd et al. 2007). Western yellow-billed cuckoos appear to require large tracts of contiguous habitat (Sutter et al. 2005), and population declines across the western U.S. are due primarily to the loss of

cottonwood-dominated riparian habitat. This loss is usually a result of conversion to agriculture, dams and river flow management, bank protection, overgrazing, competition from exotic plants such as tamarisk, urban development including transportation infrastructure, and increased wildfire (Bennett and Keinath 2003; USFWS 2013b). Western yellow-billed cuckoos are further threatened by their low population size, extreme population fluctuations, and patchy distribution (Bennett and Keinath 2003). Heavy pesticide use during the last 50 years also has likely contributed to population declines by removing prey, directly poisoning birds, and causing eggshell thinning (Bennett and Keinath 2003).

There are no known occurrences of the western yellow-billed cuckoo near the NGS and associated facilities and the KM. There are known occurrences of the species along the San Juan River; however, suitable habitat along the San Juan River is located nearly 50 miles east-northeast of the NGS. Within the analysis areas, numerous patches of riparian habitat also occur in side canyons to Lake Powell (e.g., Navajo Canyon), along the San Juan River and tributaries, and in smaller washes and drainages (see Figure 11 and Figure 14). The STS corridor in the analysis area crosses several ephemeral washes containing riparian woodland, but they typically lack the standing water or saturated soils needed to support suitable habitat for yellow-billed cuckoos. Riparian habitats associated with the railroad and the KM are narrow, discontinuous, and dominated by tamarisk; the predominance of tamarisk and small size of these habitat patches (less than 50 acres) likely preclude nesting by western yellow-billed cuckoos.

There also is some potential for the species to occur in the Colorado River ERA analysis area, but riparian habitat is likely too narrow and limited in extent to support breeding cuckoos in the SW Colorado River analysis area. The NE Colorado River analysis area has marginally more potential to support nesting pairs, but the potential habitat ends at the confluence of the Colorado and Green Rivers in Utah.

There are areas of suitable habitat within the larger areas defined by the confined and unconfined portions of the N-Aquifer analysis area (e.g., the riparian woodland at Begashibito Wash/Cow Springs), and there are records of occurrences of nonbreeding cuckoos from the Cow Springs area (Corman and Magill 2000).

Within the analysis areas, proposed critical habitat occurs along the San Juan River at Lake Powell and from upstream of the confluence with Chinle Creek to near Aneth, Utah.

3.9.4.2 Federally Listed, Candidate, and Proposed Aquatic Species

While no federally listed aquatic species would be directly impacted by disturbance from the Proposed Action, four fish species could be directly impacted by NGS emissions. These four species and their occurrence in the analysis areas are shown in Table 25. No proposed or candidate aquatic species occur in the overall analysis area. The affected environment for the species listed in Table 25 is summarized below, based on information provided in the KM EA (OSMRE 2017) and KM BA (Stantec 2017).

Table 25. Federally Listed Fish Species Occurrence in the Lake Powell, Colorado River Regions, and Lower San Juan River Analysis Areas.

Species	Federal Status	Lake Powell Near Colorado River Inflow	Lake Powell Near San Juan River Inflow	Colorado River above Lake Powell Northeast Colorado River	Colorado River below Lake Powell Southwest Colorado River	Lower San Juan River
Bonytail	Endangered	X[1]		X (CH)[2]		
Colorado pikeminnow	Endangered	X[1]	X	X (CH)		X (CH)
Humpback chub	Endangered			X (CH)	X (CH)	
Razorback sucker	Endangered	X	X	X (CH)	X (CH)	X (CH)

[1] Rare occurrence in Lake Powell.
[2] CH = Designated Critical Habitat.
Source: Stantec 2017, 45 Federal Register (FR) 27710, 59 FR 13374, 32 FR 4001, 59 FR 13374, 32 FR 4001, 59 FR 13374, 56 FR 54957, 59 FR 13374.

The roundtail chub (*Gila robusta*) was also included on the list provided by USFWS, but on April 7, 2017, USFWS withdrew its proposal to list this species; therefore, it will not be discussed further in this EA.

3.9.4.2.1 Bonytail

Bonytail (*Gila elegans*) was listed as endangered under the ESA in 1980. In 1994, USFWS designated seven reaches of the Colorado River system as critical habitat for bonytail (USFWS 1994). Critical habitat is designated in portions of the Colorado, Green, and Yampa Rivers in the Upper Colorado River Basin and the Colorado River in the Lower Colorado River Basin. One of these reaches overlaps portions of the NE Colorado River analysis area (Table 25), which includes 12.8 miles of bonytail critical habitat.

Once widespread in the large rivers of the Colorado River Basin, there are currently no self-sustaining populations of bonytail in the wild, and very few individuals have been captured throughout the Upper and Lower Colorado River Basins (USFWS 2002b). Bonytail habitat generally consists of mainstem riverine areas and impoundments in the Colorado River system. Deep pools and eddies with slow to fast currents are characteristic of the riverine habitat (Kaeding et al. 1986). Critical habitat includes river channels and flooded, ponded, or inundated riverine areas, especially where competition from nonnative fishes is absent or reduced (USFWS 1994). Primary Constituent Elements (PCEs) for the critical habitat of the four Colorado River federally endangered fish species discussed in this EA include the following components (USFWS 1994):

- Water – This component includes a quantity of water of sufficient quality (i.e., temperature, dissolved oxygen, nutrients, turbidity, and lack of contaminants) that is delivered to a specific location in accordance with the hydrologic regime that is required for a particular life stage for each species.
- Physical Habitat – This component includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or corridors between these areas. In addition to river channels, these areas also include bottom lands, side channels, oxbows, backwaters, and other areas in the 100-year floodplain, which when inundated provide spawning, nursery, feeding, and rearing habitats, or access to these habitats.

- Biological Environment – Food, predation, and competition elements of the biological environment are considered important components. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although normal components of the biological environment, can be out of balance due to introduced nonnative fish species.

The most recent recovery review concluded that bonytail has not yet achieved demographic recovery goals that are indicative of a healthy, viable, and sustainable population level, and that the biggest threats to bonytail include habitat shortage, predation, and degraded water quality (USFWS 2012b). Limiting factors for bonytail in the analysis area above Glen Canyon Dam include streamflow reductions due to water diversions, habitat fragmentation, competition with and predation by nonnative fish species, and water quality changes due to pesticides and pollutants (USFWS 2002b). Potential risk to this species from existing chemical exposure was evaluated quantitatively in the Colorado River ERA (Ramboll Environ 2016a), which concluded that there is no existing risk from baseline chemical exposure to bonytail present in the analysis areas.

Bonytail occurrence and critical habitat in the analysis areas is shown in Table 25. More detailed descriptions of bonytail life history, habitat, and occurrence are provided in the KM EA (OSMRE 2017) and KM BA (Stantec 2017).

3.9.4.2.2 Colorado Pikeminnow

Colorado pikeminnow (*Ptychocheilus lucius*) was listed as endangered in 1967 and retained its endangered status with the passage of the ESA in 1973. In 1994, USFWS designated six reaches of the Colorado River system as critical habitat for the species (59 FR 13374). A total of 1,148 miles of pikeminnow critical habitat is designated in portions of the Colorado, Green, Yampa, White, and San Juan Rivers. Two of the six reaches overlap portions of the SW Colorado River analysis area, which contains 48.8 miles of critical habitat, and the San Juan River analysis area, which contains 233.3 miles of critical habitat (Table 25). Colorado pikeminnow critical habitat in the overall analysis area is illustrated in NGS-KMC DEIS Figure 3.13-1.

Once widespread in the large rivers of the Colorado River Basin, Colorado pikeminnow is found in 1,029 miles of riverine habitat in the Green River, Upper Colorado River, and San Juan River subbasins (NatureServe 2013). Habitat requirements of Colorado pikeminnow vary depending on the life stage and season. Young-of-year and juveniles prefer shallow backwaters, while adults use pools, eddies, and deep runs that are maintained by high spring flows (USFWS 2002c). Adults are highly mobile during the spawning period, which occurs after peak runoff in mid-June to mid-August. In the Upper Colorado River Basin (i.e., Green and Colorado Rivers), adults have been documented traveling up to 400 miles and within multiple rivers (Osmundson and White 2009). In the San Juan River, Colorado pikeminnow move long distances upstream from spring to summer, and then move back downstream in the winter (Durst and Franssen 2014).

The most recent recovery review concluded that there is a moderate degree of threat and a high degree of recovery potential for Colorado pikeminnow at the species level taxonomically (USFWS 2011). Recovery of the species is considered necessary only in the Upper Colorado River Basin (Green River, Upper Colorado River, and San Juan River subbasins); historic populations of this species in the Lower Colorado River Basin are extirpated.

Colorado pikeminnow occurs throughout the Southwest Colorado River Region, which includes Lake Powell upstream to the Colorado River confluence with the Green River. Habitat in this area consists of Lake Powell, slow-moving inflow areas in the Colorado River arm, and relatively narrow riverine reaches with flows. A major portion of the Southwest Colorado River Region consists of Cataract Canyon, where

the upper section of the canyon consists of large eddy/pool complexes interspersed between large rapids. The lower 32 miles of Cataract Canyon is inundated by Lake Powell at full-pool elevation (Badame 2008).

Limiting habitat factors in the Southwest Colorado River Region would be the same as discussed for bonytail. Factors affecting the San Juan River are described in the Four Corners Power Plant and Navajo Mine Energy Project Biological Opinion (USFWS 2015a) and consist of impacts on water quality from elevated metal concentrations, sediment, salinity, temperature, fecal matter, and dissolved oxygen.

Baseline concentrations of metals occurring in fish within the analysis areas were analyzed in the Colorado River ERA (Ramboll Environ 2016a). Results of the analysis indicated negligible risks from baseline exposure levels (Ramboll Environ 2016a).

Colorado pikeminnow occurrence and critical habitat in the analysis areas is shown in Table 25. More detailed descriptions of Colorado pikeminnow life history, habitat, and occurrence are provided in the KM EA (OSMRE 2017) and KM BA (Stantec 2017).

3.9.4.2.3 Humpback Chub

Humpback chub (*Gila cypha*) was listed as endangered in 1967. In 1994, USFWS designated seven reaches of the Colorado River system as critical habitat for humpback chub (USFWS 1994). A total of 379 miles of critical habitat is designated in portions of the Colorado, Green, and Yampa Rivers in the Upper Colorado River Basin and the Colorado and Little Colorado Rivers in the Lower Colorado River Basin. In the analysis areas, 12.9 miles of critical habitat for humpback chub occurs in the Upper Colorado River in Cataract Canyon and in the Lower Colorado River, from the confluence with the Little Colorado River and extending about 27 miles upstream (Ramboll Environ 2016a).

Humpback chub is represented by six populations in 470 miles of riverine habitat: five in the upper basin recovery unit and one in the lower basin recovery unit where it occurs in the mainstem of the Colorado River in Marble and Grand Canyons and the Little Colorado River (USFWS 2011). None of the upper basin recovery unit is considered to be self-sustaining as a result of poor recruitment. The lower basin recovery unit is a self-sustaining population, with the Grand Canyon adult population estimate of 7,650 in 2008. The Grand Canyon and Little Colorado River population is considered a core population. Recent estimates indicate that the Grand Canyon and Little Colorado River population is stabilizing after a decade of decline (USFWS 2011).

Humpback chubs mainly occur in river canyons in a variety of habitats including deep pools, eddies, upwells near boulders, and areas near steep cliff faces (NatureServe 2014). As young humpback chubs mature, they shift toward deeper and swifter offshore habitats (USFWS 2002d). Within the Grand Canyon, humpback chubs occur primarily in the vicinity of the Little Colorado River confluence, with adults being associated with large eddy complexes. Subadult humpback chubs in the Colorado River downstream of the Little Colorado River have been recorded in higher densities along shoreline areas with vegetation, talus slopes, and debris fans (Converse et al. 1998). In the analysis areas, humpback chubs occur in the Cataract Canyon portion of the Colorado River immediately upstream of Lake Powell.

Humpback chubs are broadcast spawners with a relatively low fecundity rate compared to other minnow species of similar size (USFWS 2002d). Spawning primarily occurs at temperatures ranging from 16ºC to 22ºC in March through May in the lower basin and during April through June in the upper basin. The main spawning area for humpback chubs in the Grand Canyon is the Little Colorado River, which provides warm water temperatures and shallow velocity pools for larvae (Gorman 1994).

Factors affecting baseline conditions in the SW Colorado River analysis area for humpback chubs are described in the Glen Canyon Dam LTEMP (Reclamation and NPS 2016) and include impacts on water

quality from elevated metal concentrations, sediment, salinity, temperature, fecal matter, and dissolved oxygen; effects of dams and reservoirs on water temperature; flow reductions resulting from water diversions; and predation by and competition from nonnative fish.

Potential risk to humpback chubs from existing chemical exposure was evaluated quantitatively in the Colorado River ERA (Ramboll Environ 2016a). Based on this analysis, no potential risk from exposure to baseline concentrations of arsenic, mercury, and selenium exists within the NE Colorado River analysis area. Results of the analysis indicated negligible risks from baseline exposure levels (Ramboll Environ 2016a). Similarly, results for the SW Colorado River analysis area indicated that baseline chemical exposure poses negligible risks to humpback chubs in the Lower Colorado River (Ramboll Environ 2016a).

3.9.4.2.4 Razorback Sucker

The razorback sucker (*Xyrauchen texanus*) was listed as threatened under the ESA in 1991. In 1994, USFWS designated 15 reaches of the Colorado River system as critical habitat (USFWS 1994). A total of 1,724 miles of critical habitat for the razorback sucker is designated in portions of the Green, Yampa, Duchesne, Colorado, White, Gunnison, and San Juan Rivers in the Upper Colorado River Basin and the Colorado and Little Colorado Rivers in the Lower Colorado River Basin. Critical habitat in the Colorado River includes reaches in the Upper Colorado River Basin (above and below Westwater Canyon in Colorado and Utah and the Lower Colorado River Basin from the confluence with the Paria River to the Hoover Dam). Critical habitat in the analysis areas consists of 48.8 miles in the NE Colorado River analysis area, 68.4 miles in the SW Colorado River analysis area, and 211.1 miles in the San Juan River analysis area.

Historically, the razorback sucker occupied the mainstem Colorado River and many of its tributaries from northern Mexico through Arizona and Utah into Wyoming, Colorado, and New Mexico (USFWS 2002e). Existing populations of razorback sucker occur in the Green River, Upper Colorado River, and San Juan River subbasins; in the Lower Colorado River between Lake Havasu and Davis Dam; in Lake Mead and Lake Mohave; in small tributaries of the Gila River subbasin (Verde and Salt Rivers, Fossil Creek); in the deltas of rivers that empty into Lake Powell; and in the upper reaches of Lake Powell (USFWS 2002e). Razorback suckers do not occur in the lower portion of Lake Powell near the lake pump facility and water intakes.

The types of habitat used by razorback suckers vary depending on the life stage and time of year. Seasonal habitat use includes pools and eddies from November through April, runs and pools from July through October, runs and backwaters in May, and backwaters and flooded gravel pits in June. Juveniles prefer shallow water with minimal flow in backwaters, tributary mouths, off-channel impoundments, and lateral canals (Maddux et al. 1993). In the Upper Colorado River Basin, bottomlands, low-lying wetlands, and oxbow channels flooded and ephemerally connected to the main channel by high spring flows are important habitats for all life stages of razorback suckers. Flow recommendations have been developed to enhance habitat complexity and restore and maintain ecological processes. In the Lower Colorado River Basin, adult razorback suckers use open water areas, except in the breeding season, when they congregate in shallow nearshore areas (USFWS 2002e). Larval razorback suckers in Lake Mohave occupied vegetated areas near the shore.

Spawning usually occurs in April through mid-June when river flows are relatively high and adult razorback suckers congregate in flooded bottomlands and gravel pits, backwaters, and impounded tributary mouths near spawning sites (USFWS 2002e). The thermal preference for spawning is 22ºC to 25ºC. Razorback suckers typically migrate a long distance in large numbers during the spawning season.

Factors contributing to the decline of the razorback sucker throughout its range are described in the Glen Canyon Dam LTEMP (Reclamation and NPS 2016) and primarily include habitat loss due to dam

construction, loss of spawning and nursery habitats as a result of diking and dam operations, and alteration of flow hydrology. In addition, competition with and predation by nonnative fishes have been identified as important factors in the decline of this species. In the Grand Canyon, the decline of native fish, including the razorback sucker, has been attributed in large part to an increased diversity and abundance of nonnative fishes, along with the effects of the Glen Canyon Dam on water temperatures, flow, and sediment (Gloss and Coggins 2005).

Potential risk to razorback suckers from existing chemical exposure was evaluated quantitatively in the ERAs (Ramboll Environ 2016a, 2016f). Based on concentrations of mercury in fish tissue, baseline exposure conditions present a risk for razorback suckers in the SW Colorado River analysis area. Razorback sucker maximum (HQ = 5) and refined (HQ = 3) methylmercury HQs exceeded 1, using the flannelmouth sucker as a surrogate species; however, the maximum and refined HQs were less than or equal to 1 using an alternate surrogate, the bluehead sucker (Ramboll Environ 2016a). The ERAs concluded that existing risk from exposure to other COPECs in the SW Colorado River analysis area and to all COPECS in the San Juan River analysis area is negligible (Ramboll Environ 2016a, 2016f).

3.9.4.3 Federally Listed, Proposed, and Candidate Plant Species

Four plant species potentially affected by the Extension Lease and their occurrence in the analysis areas are shown in Table 26. Two plant species from the list of threatened, endangered, and proposed species provided by USFWS (2017) for the Extension Lease are not known to occur in the analysis areas and would not be affected by the existing or proposed Extension Lease for the NGS: Jones cycladenia (*Cycladenia humilis* var. *jonesii*), and Silar pincushion cactus (*Pediocactus sileri*). Because these species are not known to occur in the analysis areas or would not be affected by the Proposed Action, they are not discussed further in this EA. No proposed or candidate plant species occur in the overall analysis area. The affected environment for the species listed in Table 26 is summarized below, based on information provided in the KM EA (OSMRE 2017), KM BA (Stantec 2017), and NGS-KMC DEIS (Reclamation 2016b).

Table 26. Federally Listed, Candidate, and Proposed Plant Species Potentially Occurring in the Analysis Areas.

Common Name	Scientific Name	Federal Status[1]	Potential Occurrence in Analysis Areas[2,3]
Plants			
Brady pincushion cactus	*Pediocactus bradyi*	FE	K - NF
Fickeisen plains cactus	*Pediocactus peeblesianus* var. *fickeiseniae*	FT	P - NF, STS, and WTS
Navajo sedge	*Carex specuicola*	FT	K - N-Aquifer
Welsh's milkweed	*Asclepias welshii*	FT	K - NF and WTS, P – RR and STS

[1] FT = Federal Threatened, FE = Federal Endangered, NE = experimental nonessential, Proposed Threatened.
[2] K = Known occurrence based on Natural Heritage Program data, Navajo Natural Heritage Program (NNHP) data, data from the Peregrine Fund (California Condor), and agency input (Reclamation 2016b; OSMRE 2017; USFWS 2017); P = Potential occurrence based on habitat information, agency input, and the USFWS Information, Planning, and Conservation system.
[3] NGS = NGS lease area; RR = BM&LP Railroad analysis area; STS = Southern Transmission System; WTS = Western Transmission System, NF = NGS Near-Field analysis area; NE Colorado River = Northeast Colorado River analysis area; SW Colorado River = Southwest Colorado River analysis area; SJR = San Juan River analysis area.
Source: List of threatened, endangered, and proposed species provided by USFWS (2017) and supplemented with information from Reclamation (2016b) and Stantec (2017a). Note: Reclamation (2016b) used only for STS and WTS occurrence data.

3.9.4.3.1 Brady Pincushion Cactus

Brady pincushion cactus (*Pediocactus bradyi*) is a small succulent listed as endangered under the ESA in 1979. Current threats to this species include invasive species, collection, off-road vehicle use, mining, and livestock grazing (USFWS 2012c). Brady pincushion cactus grows within sparsely vegetated desert scrub

communities dominated by shadscale (*Atriplex concertifolia*), snakeweed (*Gutierrezia sarothrae*), Mormon tea (*Ephedra viridis*), and desert trumpet (*Eriogonum inflatum*). It occurs as sporadic dense populations along sloped benches in sunny locations (USFWS 2012c) and is restricted to habitat consisting of Kaibab limestone chips over soil derived from sandstone outcrops and Moenkopi shale. The range of Brady pincushion cactus is primarily an area approximately 15 miles long and 1 to 3 miles wide on both sides of Marble Canyon, south of Lee's Ferry, in Coconino County, Arizona, and has been recorded in the NGS Near-Field analysis area (Stantec 2017). The species occurs between 3,861 and 4,488 feet amsl and flowers between March and April (USFWS 2012c). The NGS Near-Field analysis includes an evaluation of representative plant species expected to occur in the area. Risk calculations were not performed for all special status plants because of the similarity of habitat and exposure patterns among closely related species. Representative species were selected based on multiple discussions with stakeholders and USFWS. Brady pincushion cactus was one of the special status plants selected as a representative species within the NGS Near-Field analysis area ERA analysis (Ramboll Environ 2016f). Results of the ERA indicated that baseline soil concentrations of COPECs are negligible and unlikely to pose a risk to Brady pincushion cactus.

3.9.4.3.2 Fickeisen Plains Cactus

Fickeisen plains cactus (*Pediocactus peeblesianus* var. *fickeiseniae*) was listed as endangered under the ESA in 2013 and is also a Navajo endangered plant. It is a narrow endemic restricted to exposed layers of Kaibab limestone within the Colorado Plateau and found in well-drained, shallow, gravelly loam soils formed from alluvium, colluvium, or Aeolian deposits derived from limestone of the Harrisburg Member of the Kaibab and Toroweap Formations. Most populations occur on the margins of canyon rims, flat terraces and benches, or toes of well-drained hills having less than 20 percent slope within the plains and Great Basin grasslands and desert scrub communities. Populations are widely scattered and found at approximately 4,200 to 5,959 feet amsl (USFWS 2015b). The species flowers in late April and produces fruit from May to June (Mikesic and Roth 2008).

Habitat for Fickeisen plains cactus includes shrubland and desert scrub communities but is restricted to specific soils and geological substrates. It is known to occur in Coconino and Mohave Counties in Arizona. In Coconino County, it is scattered from House Rock Valley and Gray Mountain, as well as the canyons of the Little Colorado and Colorado Rivers. Populations in Mohave County have been found as far west as Dutchman Draw and Grandstand (Mikesic and Roth 2008). Potential habitat for Fickeisen plains cactus occurs in the NGS Near-Field analysis area and the STS ROW corridor in the Moenkopi Switchyard area (Navajo Nation Department of Fish and Wildlife [NNDFW] 2014).

Fickeisen plains cactus has not been confirmed within the NGS Near-Field analysis area but was chosen as a representative plant species within the NGS Near-Field analysis area ERA analysis (Ramboll Environ 2016f). Results of the ERA indicated baseline soil concentrations of COPECs are negligible and unlikely to pose a risk to Fickeisen plains cactus.

3.9.4.3.3 Navajo Sedge

Navajo sedge (*Carex specuicola*) is a perennial forb listed as threatened under the ESA in 1985 and is also a Navajo endangered G3 species. Navajo sedge is a wetland obligate of seeps and springs and typically is found in hanging gardens within alcoves of sandstone cliffs of varying height and slope between 4,200 and 7,600 feet amsl (USFWS 2014). Navajo sedge also is known to occur on even ground terrain associated with seeps and springs (USFWS 2014). It is associated with other hanging garden plants such as Eastwood's monkey flower (*Mimulus eastwoodiae*), giant helleborine (*Epipactis gigantae*), sand bluestem (*Andropogon hallii*), thistles (*Cirsium* spp.), foxtail barley (*Hordeum jubatum*), and common reed (*Phragmites communis*) (USFWS 2015c). Navajo sedge flowers between late June and September (USFWS 2014).

Navajo sedge potentially occurs within the spring groups and washes in the N-Aquifer analysis area. There are known occurrences near Tsegi Canyon, about 6 miles northwest of the KM, and Ha Ho No Geh Canyon near its confluence with Moenkopi Wash. There are also known occurrences and suitable habitat at Canyon de Chelly National Monument, but these areas are most likely supported by groundwater in that area and are outside of the analysis area for the Extension Lease. Critical habitat for Navajo sedge is located within the N-Aquifer analysis area but not within any of the potentially affected spring groups and washes. No occurrence records for Navajo sedge are known from the KM Permit Area, and no suitable habitat exists within the KM boundary.

3.9.4.3.4 Welsh's Milkweed

Welsh's milkweed is a herbaceous perennial forb listed as threatened in 1987 and also is a Navajo endangered G3 species. Welsh's milkweed grows on open, sparsely vegetated, semistabilized sand dunes and the lee slopes of actively drifting sand dunes (USFWS 2015d). These active sand dunes are found within sagebrush, juniper, and ponderosa pine communities and occur from 4,700 to 6,200 feet amsl (USFWS 2015e). Flowering occurs from June to July (Mikesic and Roth 2008).

Welsh's milkweed is known to occur in the NGS Near-Field analysis area and the WTS corridor crossing of the Colorado River near Page, Arizona. Suitable habitat occurs among stabilized sand dune communities along the railroad and STS ROW corridors (NNDFW 2014).

Baseline deposition exposure was evaluated for Welsh's milkweed in the NGS Near-Field analysis area ERA analysis (Ramboll Environ 2016f). Results of the ERA indicated baseline soil concentrations of COPECs are negligible and unlikely to pose a risk to Welsh's milkweed.

3.9.4.4 Navajo Nation Endangered Species Not Federally Listed

Navajo endangered species list G2 or G3 wildlife, fish, and plant species potentially occurring in the analysis areas, as well as their habitat requirements, are shown in Table 27. G2 and G3 species are species or subspecies for which the prospects of survival or recruitment on Navajo Tribal Trust Lands are in jeopardy or are likely within the foreseeable future to become so and are hereafter referred to as NNE species.

Table 27. Navajo Nation Endangered Species Not Federally Listed.

Common Name	Scientific Name	Status[1]	Habitat	Occurrence in Analysis Areas[2,3]
Birds				
Bald eagle	*Haliaeetus leucocephalus*	G2	Nest in trees adjacent to large waterbodies with suitable prey. No known bald eagle nests are within the analysis areas. Winter roosts are in large trees in forests, in river bottoms, or near canyon rims within a few miles of ponds, lakes, and rivers with adequate prey. Wintering eagles occur along the San Juan and Colorado Rivers (Mikesic and Roth 2008). Preferred prey is fish but also consumes birds and mammals, often as carrion (especially in winter). Takes a variety of aquatic and terrestrial mammals including muskrats, hares, reptiles and amphibians, and a variety of birds including many species of waterfowl and gulls (Buehler 2000).	K - NGS, NE Colorado River, SW Colorado River, SJR, KM, STS, WTS P - RR
Ferruginous hawk	*Buteo regalis*	G3	Nest in badlands, flat or rolling desert grasslands, and desert scrub. On Navajo Tribal Trust Lands, most nests are located on clay or rock pinnacles, small buttes, and short cliffs. Some nests are placed on juniper trees or on the ground. Preferred prey consists of cottontail rabbits, jackrabbits, prairie dogs, ground squirrels, and gophers (Mikesic and Roth 2008).	K - RR, KM, STS, WTS
Golden eagle	*Aquila chrysaetos*	G3	Nest on steep cliffs normally directly adjacent to foraging habitat of desert grasslands or, with only sparse shrubs if present, that supports primary prey of cottontail rabbits and jackrabbits (Mikesic 2008).	K - NGS and RR, KM, STS, WTS
American dipper	*Cinclus mexicanus*	G3	Primarily associated with fast-moving, clear, unpolluted streams with cascades, riffles, and waterfalls (Wilson and Kingery 2011). Primarily feeds on aquatic insects, but also may take small fish and fish eggs (Wilson and Kingery 2011).	P - NGS, RR, NE Colorado River, SW Colorado River, SJR
Amphibians				
Northern leopard frog	*Lithobates pipiens*	G2	Variety of habitats including grasslands, brush land, woodlands, and forests. Most often found in permanent waters with rooted aquatic vegetation, but may frequent ponds, canals, marshes, springs, and streams (AGFD 2002).	K[4] - N-Aquifer, NE Colorado River

Common Name	Scientific Name	Status[1]	Habitat	Occurrence in Analysis Areas[2,3]
Mammals				
Desert bighorn sheep	*Ovis canadensis nelsoni*	G3	Occur in cliff, canyon, and desert scrub habitats. Diet consists of mostly grasses, but also eat forbs and browse (Festa-Bianchet 2008).	P - NGS (including RR), STS
Pronghorn	*Antilocapra americana*	G3	Desert scrub and desert grasslands.	K - STS
Plants				
Alcove bog-orchid	*Platanthera zothecina*	G3	Seeps, hanging gardens, and moist stream areas from the desert shrub to pinyon-juniper and ponderosa pine/mixed conifer communities. Known populations occur between 4,000 and 7,200 feet in elevation.	K - N-Aquifer
Alcove death camass	*Zigadenus vaginatus*	G3	Hanging gardens in seeps and alcoves, mostly on Navajo sandstone. Elevations range between 3,700 and 6,700 feet.	P - N-Aquifer

[1] Navajo Endangered Species List status:
G2 = Group 2: A species or subspecies for which the prospects of survival or recruitment are in jeopardy.
G3 = Group 3: A species or subspecies for which the prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future.
Group 4 (G4) species are any species for which the Nation does not have sufficient information to support their being listed as G2 or G3 but has reason to consider them; these species are listed in Appendix 4; species descriptions and effects are described in the KM EA (OSMRE 2017).
[2] K = Known occurrence based on Natural Heritage Program data, Navajo Natural Heritage Program (NNHP) data, data from the Peregrine Fund (California Condor), and agency input (Reclamation 2016b; OSMRE 2017; USFWS 2017); P = Potential occurrence based on habitat information, agency input, and the USFWS Information, Planning, and Conservation system.
[3] NGS = NGS Near-Field analysis area; RR = BM&LP Railroad analysis area; STS = Southern Transmission System; WTS = Western Transmission System, NF = NGS Near-Field analysis area; NE Colorado River = Northeast Colorado River analysis area; SW Colorado River = Southwest Colorado River analysis area; SJR = San Juan River analysis area; N-Aquifer = N-Aquifer analysis area.
[4] Historic records in Cow Springs, Chuska Mountains, Little Colorado River, Colorado River, San Juan River, Navajo Creek, Chinle Creek, and Canyon de Chelly, and near Tuba City, Cameron, Thoreau, and Newcomb; however, no recent occurrence in the analysis areas has been documented (Smith and Hazelton 2014).
Source: OSMRE 2017; Reclamation 2016b; NNDFW 2008. Note: Reclamation 2016b used only for STS and WTS occurrence data.

3.9.5 Environmental Consequences

This section describes the direct and indirect effects of the No Action alternative on special status species, followed by the effects of the Proposed Action, and then the cumulative effects of the Proposed Action.

Reclamation conducted an effects analysis of listed species within the project area based on 2 years of NGS and Kayenta Mine operations; 35+ years of STS and WTS operations; and NGS, STS, and WTS retirement. Reclamation made a determination of "may affect, not likely to adversely affect" for 10 federally listed species (including critical habitat for 4 of these species where applicable). Reclamation initiated informal Section 7 consultation with the USFWS on September 18, 2017. The USFWS responded with a memorandum dated October 20, 2017, indicating its concurrence with Reclamation's determination. This concurrence is included as Appendix 5 to this EA.

3.9.5.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.

3.9.5.1.1 NGS and Associated Facilities

When the NGS ceased to operate, water requirements at the plant would be 5 to 10 percent of the amount that the NGS has historically used from Lake Powell. After demolition and earthmoving activities are completed, NGS water withdrawals from Lake Powell would cease. Reducing NGS withdrawals from Lake Powell would result in a slight increase (about 0.3 percent) in storage volume and surface area. The Lake Powell storage volumes fluctuate seasonally and from year to year, depending on inflow and dam releases (see Section 3.8.3.1). The lake pool elevation can rise more than 10 feet over a short period. The mean and maximum depths are 132 and 560 feet, respectively. Any reductions in terrestrial special status species habitat from increases in storage volume at Lake Powell would be imperceptible. The increase in storage volume could also increase available habitat for special status aquatic species and increase dilution of contaminants, but these effects would likely be imperceptible. Combustion of coal at the NGS would cease, and there would be no emission impacts on special status species.

3.9.5.1.2 KM

Reclaimed areas in the KM analysis area would be monitored twice annually for a period of 10 years to monitor the establishment of seeded vegetation and control of noxious weeds.

3.9.5.1.3 STS and WTS on Navajo Tribal Trust Lands

If retirement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands occurs, there would be a temporary disturbance of approximately 1,280 acres. STS and WTS retirement activities are described in Section 2.3.3.3. If the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained as they have historically, the impacts would be the same as the Proposed Action in Section 3.9.5.2.3.

3.9.5.1.4 Species-Specific Potential Impacts from the No Action Alternative

Other potential impacts of the No Action alternative on special status species are discussed in the subsections below.

California Condor

NGS and Associated Facilities

Impacts on California condor associated with NGS retirement activities are unlikely because occurrence of California condors near these facilities is infrequent and transitory. Because these facilities are fenced, cattle and big game that could provide a source of carrion that would attract condors do not occur in the facilities. Consequently, retirement of the NGS and associated facilities under the No Action alternative would have inconsequential impacts on the California condor.

KM

The effects of the No Action alternative at the KM on California condor would be the same as the effects at the NGS and associated facilities.

STS and WTS on Navajo Tribal Trust Lands

Over the 40 years of operation of the STS and WTS, no impacts on California condors have been documented. When the STS and WTS were retired, replacement of tower structures, removal of coil conductors, decommissioning of communication towers, retirement of the switchyard, and construction or improvement of access roads would not result in any appreciable effects on condors given their infrequent use of the STS and WTS corridors and the temporary nature of the activities. The Retirement Actions described in Section 2.4.3 would include measures to minimize effects of STS and WTS retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the Migratory Bird Treaty Act (MBTA) and ESA. If STS and WTS operations continued, the effects on the California condor would be the same as described for the Proposed Action.

Mexican Spotted Owl

NGS and Associated Facilities

Mexican spotted owls do not occur on the NGS plant site or along the BM&LP Railroad and, therefore, would not be affected by NGS retirement activities.

KM

Mexican spotted owls occur within the analysis area near the KM; however, retirement activities would not occur in occupied habitat. Although noise or light disturbance from KM retirement activities could have “negligible to minor” impacts on Mexican spotted owls (OSMRE 2017), known PACs are located more than 0.5 mile from these activities. Owls would not likely be directly affected by noise or light disturbance given the distance of suitable habitat from retirement activities and the implementation of BMPs described in the KM EA (OSMRE 2017), such as monitoring for the presence of Mexican spotted owls in potential habitat in the analysis area and implementing avoidance measures in occupied habitat or PACs.

Southwestern Willow Flycatcher

NGS and Associated Facilities

Based on existing habitat and occurrence records, southwestern willow flycatchers are expected to occur rarely within the analysis area, and primarily during migration or post-breeding dispersal. Although no resident flycatchers are known to occur within the overall analysis area, nesting flycatchers could occur in suitably sized patches of riparian woodland or scrubland habitats along the Colorado River, San Juan River, Little Colorado River, and smaller drainages such as Begashibito Wash. Implementation of the NGS O&M Plan (SRP 2017d), such as monitoring for presence of southwestern willow flycatchers in the analysis area, implementing avoidance measures where known populations of southwestern willow flycatchers occur, and minimizing construction and vehicle use in riparian areas, would minimize impacts on southwestern willow flycatchers. Therefore, direct effects on resident or breeding flycatchers would not be expected. Railroad disturbance of riparian areas would be eliminated after NGS operations ceased. Demolition and decommissioning of the catenary system associated with the railroad would be a temporary source of disturbance to riparian habitat in at least the lower (more southern) portions of the Begashibito Wash/Cow Springs area.

KM

According to the KM EA, “Groundwater monitoring of the N-Aquifer has demonstrated that water withdrawal has not had significant impacts on riparian areas downstream of the Permit Area, which includes stopover habitat for migrating southwestern willow flycatchers” (OSMRE 2017). Therefore, impacts on southwestern willow flycatcher potentially using these areas would be imperceptible.

STS and WTS on Navajo Tribal Trust Lands

When the STS and WTS are retired, replacement of tower structures, removal of coil conductors, decommissioning of communication towers, and construction or improvement of access roads could result in disturbance of southwestern willow flycatchers but would not result in any appreciable effects on flycatchers given their infrequent use of the STS and WTS corridors and the temporary nature of the activities. Replacement of tower structures, removal of coil conductors, and associated construction or improvement of access roads could result in degradation of southwestern willow flycatcher habitat; however, effects would be imperceptible given the limited suitable habitat available in the STS and WTS analysis areas. The Retirement Actions described in Section 2.4.3 would include measures to minimize the effects of STS and WTS retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the MBTA and ESA.

If STS and WTS operations and maintenance continued, the effects on southwestern willow flycatchers would be the same as described for the Proposed Action.

Critical Habitat

No critical southwestern willow flycatcher habitat would be directly affected by the No Action alternative.

Western Yellow-Billed Cuckoo

NGS and Associated Facilities

The only known records of western yellow-billed cuckoos in the analysis areas are more than 50 miles northeast of the NGS plant along the San Juan River (Stantec 2017). The No Action alternative would not affect any resident western yellow-billed cuckoos. Western yellow-billed cuckoos may occur in riparian habitat throughout the analysis areas, but likely only during migration or dispersal.

Riparian habitats in and around the BM&LP Railroad are narrow, discontinuous, and dominated by tamarisk; the predominance of tamarisk and small size of these habitat patches (less than 50 acres) likely preclude nesting by western yellow-billed cuckoos (Stantec 2017). Effects on migrating or dispersing western yellow-billed cuckoos from noise associated with demolition and decommissioning of the catenary system associated with the railroad would be similar to effects described above for the southwestern willow flycatcher.

KM

The effects of groundwater pumping from the N-Aquifer on habitat potentially supporting western yellow-billed cuckoos would be similar to the effects described above for the southwestern willow flycatcher. The effects of groundwater pumping and mine dewatering at the KM on the western yellow-billed cuckoo would be imperceptible.

STS and WTS on Navajo Tribal Trust Lands

Potential impacts of ongoing operations and maintenance and retirement of the STS and WTS on the yellow-billed cuckoo would be the same as described above for the southwestern willow flycatcher.

Federally Listed Fish Species

The No Action alternative would not directly affect federally endangered fish species or their habitat because none of these species occur in the direct effects analysis areas and because the No Action alternative would not affect habitat for these species.

Brady Pincushion Cactus

Within the overall analysis area, the Brady pincushion cactus is only known to occur in Marble Canyon in the NGS Near-Field analysis area. Under the No Action alternative, combustion of coal at the NGS would cease, and there would be no additional emissions impacts on special status species. Because it doesn't occur in the other analysis areas, retirement activities would have no effect on the Brady pincushion cactus.

Fickeisen Plains Cactus

NGS and Associated Facilities

Potential impacts from NGS emissions and retirement activities would be the same for Fickeisen plains cactus as for Brady pincushion cactus.

KM

The KM would have no direct effects on the Fickeisen plains cactus under the No Action alternative.

STS and WTS on Navajo Tribal Trust Lands

As discussed in Section 3.9.4.3.2, the only area where potential habitat for Fickeisen plains cactus occurs in the STS or WTS analysis areas is in the STS ROW corridor near the Moenkopi Switchyard area (NNDFW 2014). Retirement of the transmission system could result in disturbance of potential habitat for Fickeisen plains cactus, but effects would be imperceptible because disturbance would be limited to temporary access roads and storage areas in an area that is already disturbed. The Retirement Actions described in Section 2.4.3 would include measures to minimize effects of STS and WTS retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the ESA. If STS and WTS operations and maintenance continued, the effects on Fickeisen plains cactus would be the same as described for the Proposed Action.

Navajo Sedge

NGS and Associated Facilities

The No Action alternative would have no direct effects on the Navajo sedge from the NGS and associated facilities.

KM

The Navajo sedge has known locations within the N-Aquifer analysis area and potential to occur within the affected spring groups and along affected washes. Projected effects on baseflows in spring groups and washes within the analysis areas are small, and effects on potential habitat for Navajo sedge from these baseflow changes are expected to be inconsequential because the estimated changes in spring flow would be minimal or are not anticipated. The occurrence of Navajo sedge near Tsegi Canyon is likely supported by recharge to exposed Navajo sandstone from the north, as opposed to groundwater discharge from the N-Aquifer to the south (OSMRE 2011b). When precipitation falls on the exposed Navajo sandstone in the Tsegi Canyon, some water travels through cracks and discharges from the canyon walls. These water discharges are enough to support hanging garden communities. Groundwater pumping cannot occur above the Laguna Creek saturated alluvium and therefore would not have an effect on the population of Navajo sedge at Tsegi Canyon.

STS and WTS on Navajo Tribal Trust Lands

The No Action alternative would have no direct effects on the Navajo sedge from the STS and WTS on Navajo Tribal Trust Lands.

Welsh's Milkweed

NGS and Associated Facilities

Demolition of the catenary system associated with the railroad would involve removing the electrical distribution lines, supporting superstructure, concrete foundations, and transformers, but would occur on previously disturbed land and therefore would not affect Welsh's milkweed.

KM

The KM would have no direct effects on the Welsh's milkweed under the No Action alternative.

STS and WTS on Navajo Tribal Trust Lands

Retirement of the transmission system could result in disturbance of potential habitat for Welsh's milkweed, but effects would be imperceptible because disturbance would be limited to temporary access roads and storage areas in an area that is already disturbed. The Retirement Actions described in Section 2.4.3 would include measures to minimize effects of STS and WTS retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the ESA. If STS and WTS operations and maintenance continued, the effects on Welsh's milkweed would be the same as described for the Proposed Action.

Navajo Nation Endangered Species

NGS and Associated Facilities

Demolition and decommissioning of NGS structures, buildings, the catenary system, and other facilities described in Section 2.4.1.1 could result in short-term (2 to 3 years) degradation or removal of bald eagle, ferruginous hawk, golden eagle, or desert bighorn sheep habitat, but these impacts would be inconsequential due to the lack of undisturbed habitat in the areas, duration of disturbance, and implementation of BMPs described in the NGS O&M Plan (SRP 2017d). The operator would coordinate with USFWS and the federal land manager to assure compliance with the MBTA and Bald and Golden Eagle Protection Act, as appropriate, if any raptor nests, including golden and bald eagle and ferruginous hawk nests, were found on NGS system infrastructure and needed to be removed. Demolition, decommissioning, and reclamation activities would increase noise and light pollution, but effects on bald eagles, ferruginous hawks, golden eagles, or desert bighorn sheep and their habitat surrounding the NGS would be short-term and inconsequential, lasting until reclamation activities were complete. Minor disturbance would continue during long-term monitoring activities.

KM

Demolition and decommissioning of KM structures, buildings, the catenary system, and other facilities described in Section 2.4.2 could result in short-term (2 to 3 years) degradation or removal of bald eagle, ferruginous hawk, golden eagle, or desert bighorn sheep habitat, but these impacts would be inconsequential due to the lack of undisturbed habitat in the areas, duration of disturbance, and implementation of BMPs described in the KM EA (OSMRE 2017). The operator would coordinate with USFWS and the federal land manager to assure compliance with the MBTA and Bald and Golden Eagle Protection Act, as appropriate, if any raptor nests, including golden and bald eagle and ferruginous hawk nests, were found on KM system infrastructure and needed to be removed. Demolition, decommissioning, and reclamation activities would increase noise and light pollution, but effects on bald eagles, ferruginous hawks, golden eagles, or desert bighorn sheep and their habitat surrounding the KM would be short-term and inconsequential, lasting until reclamation activities were complete. Disturbance would continue during long-term monitoring activities, but effects on bald eagles, ferruginous hawks, golden eagles, or desert bighorn sheep would not be appreciable. Effects on the northern leopard frog, alcove bog-orchid, and alcove death camas from reductions in stream baseflow associated with N-Aquifer pumping for the KM would be similar to those described above for the Navajo sedge.

STS and WTS on Navajo Tribal Trust Lands

When the STS and WTS are retired, replacement of tower structures, removal of coil conductors, decommissioning of communication towers, retirement of the switchyard, and construction or improvement of access roads could result in noise disturbance to NNE species or surface disturbance of NNE habitat. Disturbance would be temporary and would occur primarily in developed areas or areas where disturbance is ongoing. New disturbance would be limited to temporary access roads and storage and staging areas, and the Retirement Actions described in Section 2.4.3 would include measures to minimize effects of STS and WTS retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the MBTA. Therefore, STS and WTS retirement would not result in any appreciable effects on NNE species. If STS and WTS operations and maintenance continued, the effects on NNE species would be the same as described for the Proposed Action.

3.9.5.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. Impacts from these operations and retirement are discussed in the following sections.

3.9.5.2.1 NGS and Associated Facilities

NGS historical water delivery from Lake Powell would continue until operations ceased and then would continue at a reduced rate for 5 years. Effects from reducing NGS withdrawals from Lake Powell after operations ceased would be similar to the effects described above for the No Action alternative, except that under the Proposed Action, pumping would continue for 2 years prior to retirement. As described in Section 3.8, withdrawals by the NGS for water supply in 2018 and 2019 would result in a slight decrease (about 0.3 percent) in storage volume and surface area. As described above, the Lake Powell storage volumes fluctuate seasonally and from year to year, and plants, wildlife, and fish are adapted to these changes. Any reductions in terrestrial or aquatic special status species habitat due to reductions in storage volume at Lake Powell as a result of NGS withdrawals would be imperceptible. Impingement and entrainment effects on listed fish are highly unlikely given that bonytail have only been found at the upper end of Lake Powell, the intake system is in a deep portion of the lake over 100 miles away at the other end near the dam, and full operation would only occur for 2 more years after which lower withdrawals for 5 years would further reduce the frequency and rate of withdrawals. Therefore, there would be no effects on bonytail from impingement or entrainment. After 2019, the effects of Lake Powell withdrawals on special status species would be the same as those under the No Action alternative, as described in Section 3.9.5.1.

3.9.5.2.2 KM

In the Proposed Action, the KM would cease to operate by the end of December 2019 and retirement activities would commence as described in Section 2.3.3.2. Reclaimed areas in the KM analysis area would be monitored twice annually for a period of 10 years to monitor the establishment of seeded vegetation and control of noxious weeds.

3.9.5.2.3 STS and WTS on Navajo Tribal Trust Lands

As discussed in Section 2.3.3, in the Proposed Action, the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained as they have historically, for 35 years until the end of the Extension Lease term in 2054. At the end of the Extension Lease term, the lease would be extended either for 2 years to allow for retirement of the two transmission systems, or for an additional 35 years of

operation and subsequent retirement. Retirement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands would temporarily disturb approximately 1,280 acres. STS and WTS retirement activities are described in Section 2.3.3.3. Other potential impacts of the Proposed Action on special status species are discussed in the subsections below.

3.9.5.2.4 California Condor

NGS and Associated Facilities

Impacts on the California condor associated with continued operation and retirement of the NGS and associated facilities are unlikely because occurrence of California condors near these facilities is infrequent and transitory. Because these facilities are fenced, cattle and big game that could provide a source of carrion that would attract condors do not occur in the facilities. Consequently, operation and retirement of the NGS and associated facilities under the Proposed Action would have inconsequential impacts on the California condor.

Because condors have the potential to be affected by NGS emissions, the effects of the NGS coal combustion were evaluated in the NGS Near-Field ERA. The ERA concluded that little mercury or other contaminants would accumulate in large carrion, the primary source of the condor's diet, as a result of continued operation of the NGS, and potential exposure to condors would be minimal because condors are accidental or occasional visitors in this area; therefore, the risk to condors from NGS operations would be "negligible" (Ramboll Environ 2016f).

KM

Impacts on the California condor associated with continued operation and retirement of the KM and associated facilities are unlikely because occurrence of California condors in the vicinity of these facilities is infrequent and transitory. Operation and retirement of the KM and associated facilities under the Proposed Action would have "negligible" impacts on the California condor (OSMRE 2016).

STS and WTS on Navajo Tribal Trust Lands

Continued operation and maintenance of the STS and WTS would not result in any direct or indirect disturbance to California condors. California condors regularly fly over the STS and WTS corridors near Lake Powell. The relative size of the STS and WTS towers and conductors (versus distribution lines) make these facilities highly visible, and the space between conductors far exceeds a condor's wingspan. Therefore, the likelihood of a condor colliding with or being electrocuted by the transmission lines is very low, and continued operation of the STS and WTS, if it were to occur, is unlikely to affect the California condor. As stated in the NGS O&M Plan (SRP 2017d), as powerlines are replaced and maintained, installed equipment would meet the most current Avian Powerline Interaction Committee design standards to prevent bird electrocutions and collisions. Breeding California condors have been known to occasionally ingest small human-made materials and feed them to their nestling (Grantham 2007; Mee et al. 2007; Rideout et al. 2012). The NGS O&M Plan also includes a measure to remove all debris and rubbish from work sites to minimize the likelihood of condors visiting work areas. Aerial inspections of the STS and WTS have potential to disturb condors foraging near the transmission line during inspections. However, aerial inspections are conducted infrequently (once per year for STS and once per 5 years for WTS), and the disturbance is brief and unlikely to affect nesting condors. Thus, impacts on the California condor resulting from STS and WTS maintenance activities would be imperceptible. The effects of STS and WTS retirement would be the same as described for the No Action alternative.

3.9.5.2.5 Mexican Spotted Owl

NGS and Associated Facilities

Mexican spotted owls do not occur on the NGS plant site or along the BM&LP Railroad and therefore would not be affected by NGS operations or retirement activities. Because Mexican spotted owls have the

potential to be affected by NGS emissions, the effects of the NGS coal combustion were evaluated in the NGS Near-Field ERA. Results of the ERAs indicate project-related emissions pose "negligible" risks to the Mexican spotted owl (HQmax < 0.1) (Ramboll Environ 2016f).

KM

Mexican spotted owls occur within the analysis area in the vicinity of the KM; however, mining and reclamation activities would not occur in occupied habitat. The only mining-related noises that would exceed thresholds established by USFWS in Mexican spotted owl habitat about 2.0 miles (3.2 km) away would be rock drills and other heavy machinery; however, noise from these activities would fall below detectible levels beyond about 3.4 miles (5.5 km) (OSMRE 2017). Therefore, Mexican spotted owls would not be exposed to noises that could induce stress, alter behavior, or suppress breeding in the analysis area. Impacts from KM night lighting would be minimized through BMPs described in the KM EA (OSMRE 2017) to ensure the safety of mine workers while complying with MSHA and minimizing light pollution. The potential amount of light coming from the KM would not be enough to affect the natural behaviors of Mexican spotted owls or prey species (Stantec 2017). Owls are unlikely to be directly affected by mining operations, noise, or light disturbance given the distance of suitable habitat from project activities at the KM and implementation of KM BMPs, such as continuing surveys for Mexican spotted owls in suitable habitat, and implementing avoidance measures in occupied habitat or PACs (OSMRE 2017).

3.9.5.2.6 Southwestern Willow Flycatcher

NGS and Associated Facilities

Continued operation of the coal train would be a regular source of disturbance to riparian habitat in at least the lower (more southern) portions of the Begashibito Wash/Cow Springs area. Any breeding or migrating southwestern willow flycatchers currently using the Begashibito Wash/Cow Springs area would be acclimated to this disturbance and would not be affected by continued train operations. In addition, disturbance associated with train operations would be minimized or avoided by implementation of the BMPs described in the NGS O&M Plan (SRP 2017d), such as marking and avoiding or minimizing impacts on biologically sensitive areas and areas where known populations of threatened, endangered, or sensitive species occur; and minimizing construction and vehicle use in riparian areas would minimize impacts on southwestern willow flycatchers. Railroad and mining disturbance would decrease dramatically after NGS operations and retirement activities ceased.

Because southwestern willow flycatchers may occur in patches of riparian habitats throughout the analysis areas, the ERAs evaluated the chemical exposure risk for the species. Results of the ERAs indicate that project-related emissions do not pose a risk to the southwestern willow flycatcher and would have "negligible" effects on flycatchers (HQmax < 0.1 for all ERAs) (Ramboll Environ 2016a, 2016f).

KM

Continued mining would be a regular source of disturbance to riparian habitat in at least the lower (more southern) portions of the Begashibito Wash/Cow Springs area. Any breeding or migrating southwestern willow flycatchers currently using the Begashibito Wash/Cow Springs area would be acclimated to this disturbance and would not be affected by continued mining. In addition, disturbance associated with mining would be minimized or avoided by implementation of the BMPs described in the KM EA (OSMRE 2017), such as marking and avoiding or minimizing impacts on biologically sensitive areas and areas where known populations of threatened, endangered, or sensitive species occur. Mining disturbance would decrease dramatically after mining and retirement activities ceased.

According to the KM EA, "Groundwater monitoring of the N-Aquifer has demonstrated that water withdrawal has not had significant impacts on riparian areas downstream of the Permit Area, which

includes stopover habitat for migrating southwestern willow flycatchers" (OSMRE 2017). Therefore, impacts on southwestern willow flycatcher potentially using these areas would be imperceptible.

STS and WTS on Navajo Tribal Trust Lands

Continued operations and maintenance of the STS and WTS would not result in any direct or indirect disturbance to southwestern willow flycatchers or their habitat. Migrating and dispersing flycatchers may use riparian habitat patches along the STS and WTS ROW corridors. Southwestern willow flycatchers using these areas could be temporarily disturbed by helicopters during aerial inspections of the transmission line. Impacts would be avoided or minimized using the BMPs described in the NGS O&M Plan (SRP 2017d). Therefore, transmission line operation and maintenance activities are expected to have inconsequential effects on the southwestern willow flycatcher. The effects of STS and WTS retirement would be the same as described for the No Action alternative.

Critical Habitat

No critical habitat would be directly affected by the Proposed Action. Designated critical habitat on the San Juan River may be incrementally affected by project-related emissions. Emission and deposition may affect critical habitat by decreasing the health or productivity of riparian-associated species (e.g., riparian vegetation or prey populations); however, these effects on critical habitat would be imperceptible.

3.9.5.2.7 Western Yellow-Billed Cuckoo

NGS and Associated Facilities

The only known records of western yellow-billed cuckoos in the analysis areas are more than 50 miles northeast of the NGS plant along the San Juan River (Stantec 2017). The Proposed Action would not affect any resident western yellow-billed cuckoos. Western yellow-billed cuckoos may occur in riparian habitat throughout the analysis areas, but likely only during migration or dispersal.

Riparian habitats in and around the BM&LP Railroad are narrow, discontinuous, and dominated by tamarisk; the predominance of tamarisk and small size of these habitat patches (less than 50 acres) likely preclude nesting by western yellow-billed cuckoos (Stantec 2017). The effects on migrating or dispersing western yellow-billed cuckoos from noise associated with the railroad would be similar to the effects described above for the southwestern willow flycatcher.

Because western yellow-billed cuckoos may occur in patches of riparian habitat throughout the analysis areas, the ERAs evaluated the chemical exposure risk for this species. Results of the ERAs indicate that project-related emissions do not pose a risk to the western yellow-billed cuckoo and therefore would have "negligible" effects on the species (HQmax < 0.1 for all ERAs) (Ramboll Environ 2016a, 2016f).

KM

The effects of groundwater pumping from the N-Aquifer on habitat potentially supporting western yellow-billed cuckoos would be similar to the effects described above for the southwestern willow flycatcher. The effects of groundwater pumping and mine dewatering at the KM on the western yellow-billed cuckoo would be imperceptible.

STS and WTS on Navajo Tribal Trust Lands

Potential impacts of ongoing operations and maintenance and eventual retirement of the STS and WTS on the yellow-billed cuckoo would be the same as described above for the southwestern willow flycatcher.

3.9.5.2.8 Federally Listed Fish Species

Disturbance from the Proposed Action would not directly affect federally endangered fish species or their habitat because none of the listed species occur in the direct disturbance effects analysis areas and

because the Proposed Action would not affect habitat for these species. Direct impacts on endangered fish and their habitat may occur from the combustion of coal at the NGS and are described below.

As described in Section 3.9.3, ERAs for a 20-km buffer around the NGS (Near-Field) and the Colorado River were developed during preparation of the KM EA (OSMRE 2017) and KM BA (Stantec 2017) that specifically examined the potential impacts on endangered fish species (Ramboll Environ 2016a, 2016f) from NGS emissions under the Proposed Action. The ERAs evaluated the baseline conditions (as of July 2014) and the potential deposition-related impacts of operations from NGS activities through 2019. Specifically, the ERAs examined the potential effects of mercury and selenium deposition from coal combustion on the listed species. Conclusions of the ERAs with regard to effects on endangered fish are described in detail in the KM EA (OSMRE 2017) and KM BA (Stantec 2017) and are summarized below.

Combustion of coal releases mercury into the atmosphere, which may be deposited into habitat for the endangered fish directly, or onto adjacent land and subsequently washed into the river. Mercury is a concern primarily to longer-lived fish species (e.g., Colorado pikeminnow) because it bioaccumulates within the tissue of individuals over time. Mercury can affect a fish's central nervous system, alter their behaviors (e.g., reduced predator avoidance), and disrupt the endocrine system, resulting in reduced reproductive success (Lusk 2016). While the specific effects of mercury and other heavy metals on the Colorado pikeminnow are known, the role these contaminants play on suppressing populations of the endangered fish are not well understood (USFWS 2011).

Increases in selenium from the combustion of coal at the NGS could also impact endangered fish. Selenium, a trace element, is a natural component of coal and soils in the area and can be released to the environment by the irrigation of selenium-rich soils and the burning of coal in power plants with subsequent emissions to air and deposition to land and surface water. Contributions from anthropogenic sources have increased with the increases of world population, energy demand, and expansion of irrigated agriculture. Selenium, abundant in western soils, enters surface waters through erosion, leaching, and runoff. While required in the diet of fish at very low concentrations (0.1 μg/g) (Sharma and Singh 1984), excess dietary selenium causes elevated selenium concentrations to be deposited into developing eggs, particularly the yolk (Buhl and Hamilton 2000). If concentrations in the egg are sufficiently high, developing proteins and enzymes become dysfunctional or result in oxidative stress, conditions that may lead to embryo mortality, deformed embryos, or embryos that may be at higher risk for mortality.

For the bonytail, the maximum and refined HQs for mercury were less than 1, based on fish tissue concentrations. The maximum and refined HQs modeled for the bonytail surrogate were five and six orders of magnitude below 1 for selenium and arsenic, respectively, indicating no effect from project-related emissions. Based on the analysis of risk due to project-related emissions, associated tissue concentrations, and the rarity of bonytail in the analysis areas, project-related effects on bonytail in the analysis areas would be "negligible."

Project-related emissions would have minimal effects on the Colorado pikeminnow. Maximum and refined HQs for selenium and arsenic for the Colorado River analysis area were considerably less than 1. Project-related emissions would not present a potential risk to Colorado pikeminnow in the San Juan River, as the San Juan Study indicated the NGS contributes a small percentage (less than 0.05 percent) of contaminants to the San Juan River (EPRI 2016). Results for the Proposed Action showed very low maximum and refined HQs, which indicate a "negligible" risk to the species.

Effects on the humpback chub in the NE Colorado River analysis area would be the same as discussed for bonytail; maximum and refined HQs were four to five orders of magnitude less than 1, which indicates "negligible" risks. Maximum and refined tissue concentrations due to the Proposed Action also would be four to five orders of magnitude below the critical body residue thresholds. There would be no injury or loss of individual fish from arsenic, mercury, and selenium exposure. Effects in the SW Colorado River

analysis area also would be "negligible" based on HQs and tissue concentrations. Maximum and refined HQs are three to four orders of magnitude less than 1, which indicates "negligible" risks to the humpback chub. Maximum and refined tissue concentrations due to the Proposed Action also are three to four orders of magnitude below the critical body residue thresholds.

Project-related emissions would not affect the razorback sucker as HQs and critical body residues are below thresholds that indicate a "negligible" risk to the species. Maximum and refined HQs for project-related emissions effects of mercury, arsenic, and selenium were four orders of magnitude less than 1 for the SW Colorado River analysis area. Within the San Juan River portion of the analysis area, mercury, selenium, and arsenic HQs were less than 1. Based on these results, the project-related emissions would have "negligible" risks to the razorback sucker.

Injury effects on individual fish were quantified by USFWS (B. Smith 2017) for two federally listed species in the San Juan River (Colorado pikeminnow and razorback sucker) and two species in the lower Colorado River (humpback chub and razorback sucker) based on the data in the ERA (Ramboll Environ 2016a) and the San Juan Study (EPRI 2016). Injury effects were quantified based on potential effects on adult and subadult reproduction (e.g., decreased survival of offspring and fecundity), growth, and survival/mortality. Behavioral effects (e.g., predation avoidance) were also considered.

The injury effects quantification for the federally listed fish species provides an estimate of the number of individuals by life stage that could be affected by project emissions and deposition. Although based on ERA results, the separate injury effects analysis provides additional information about potential effects of NGS emissions on federally listed fish species. Both the ERA and injury effects analyses used some of the same toxicity information, such as threshold effect levels for mercury and selenium. However, the effect quantification applied toxicity information to population and life stage numbers to provide an estimate of the number of individuals affected.

Pikeminnow

USFWS has indicated that the injury impacts in the San Juan River would be insignificant compared to the average number of eggs and larvae produced by an individual female fish over a 5-year period and the number of adults directly affected by the emissions when compared to other forms of harm and harassment (B. Smith 2017). Any impact on the pikeminnow species would be so small as to not be measurable.

Humpback chub

Based on population and toxicity data, the injury effects were estimated for the humpback chub in the SW Colorado River analysis area (Stantec 2017). USFWS has indicated that these impacts would be insignificant compared to the average number of eggs and larvae produced by an individual female fish over a 5-year period and the number of adults directly affected by the emissions when compared to other forms of harm and harassment (B. Smith 2017). These impacts would be so small as to not be measurable.

Razorback sucker

Based on population and toxicity data, the injury effects were estimated for the razorback sucker in the Lower Colorado River and San Juan River (Stantec 2017). USFWS has indicated that these impacts would be insignificant compared to the average number of eggs and larvae produced by an individual female fish over a 5-year period and the number of adults directly affected by the emissions when compared to other forms of harm and harassment (B. Smith 2017). The impacts would be so small as to not be measurable.

The Proposed Action would not affect the physical habitat or biological components of bonytail, Colorado pikeminnow, or razorback sucker critical habitat. The Colorado River ERA (Ramboll Environ 2016a)

analyzed the effect of Proposed Action emissions on water quality and critical habitat in the analysis areas. The analysis of the water quality PCEs of critical habitat involved an evaluation of mercury and selenium concentrations. Baseline concentrations of mercury and selenium were considered first. The contributions from the Proposed Action in the ERA were then added to baseline concentrations. The baseline concentration, the contribution due to the Proposed Action, and the sum of the baseline and the Proposed Action contributions were compared to water quality standards.

For both mercury and selenium, based on the Proposed Action's maximum deposition concentrations, the project contribution would result in a very small addition to the baseline concentration in the NE and SW Colorado River analysis areas and would not substantively affect the baseline condition. Therefore, the Proposed Action would result in a "negligible" effect on the water quality element of bonytail, Colorado pikeminnow, and razorback sucker critical habitat in the NE and SW Colorado River analysis areas. The Proposed Action would not affect the physical habitat or biological components of critical habitat in the NE or SW Colorado River analysis areas.

The critical habitat analysis for Colorado pikeminnow and razorback sucker also includes critical habitat in the San Juan River. The methods for determining effects on critical habitat in the San Juan River resulting from project-related emissions would be the same as for the NE Colorado River analysis area, except that no methylmercury concentrations in water were available for the San Juan River. Therefore, the effects of the Proposed Action on critical habitat in this area were limited to water concentrations of total mercury (EPRI 2016). The refined and average mercury baseline concentrations and concentrations due to the Proposed Action emissions were below EPA's National Ambient Water Quality Criteria (Stantec 2017). Therefore, the addition of mercury to the environment due to the Proposed Action would result in an inconsequential effect on the water quality element of Colorado pikeminnow and razorback sucker critical habitat in the San Juan River. Refined and average selenium baseline concentrations and surface water concentrations due to the Proposed Action emissions were below the Navajo Nation Water Quality Standard. Therefore, the addition of selenium to the environment from the Proposed Action would result in a "negligible" effect on the water quality element of Colorado pikeminnow and razorback sucker critical habitat in the San Juan River.

Although no measurable impacts on federally listed fish are anticipated through 2019, out of an abundance of caution and to address the uncertainty in the modeling of emissions impacts from the NGS, the NGS would voluntarily implement two conservation measures starting in 2017. The measures would aid in the conservation and recovery of the endangered fish species, specifically the Colorado pikeminnow in the San Juan River, the razorback sucker in the San Juan River and the Colorado River below the Glen Canyon Dam, and the humpback chub in the Colorado River below the Glen Canyon Dam.

1. Support Nonnative Fish Management (Emergency Rapid Response) in the Colorado River, Grand Canyon Area

The NGS would provide funding support to NPS or other state, federal, or tribal agencies to monitor for and eradicate, as necessary, predatory nonnative fish in the mainstem Colorado River and tributaries below Glen Canyon Dam to the confluence of Lake Mead. The measure would protect and conserve the razorback sucker and humpback chub.

The funding would support implementation of the Comprehensive Fisheries Management Plan developed by NPS in 2013 to conserve and protect listed and other native fish in Grand Canyon National Park (NPS 2013). Nonnative fish could negatively impact populations of endangered humpback chub and razorback sucker within the Grand Canyon due to predation and competition. The measure would ensure agencies have funding and supplies to implement an effective rapid emergency response to nonnative fish detections. Funds could also be used by agencies (e.g., AGFD, USFWS, and NPS) to assist with

monitoring the Colorado River and tributaries below Glen Canyon Dam and critical areas of the watershed (e.g., Little Colorado River) that act as a conduit or source for nonnative fish. Funds would be provided to agencies annually (or as needed for rapid responses) for labor, travel expenses, and purchase of chemicals, nets, and other equipment to conduct monitoring, fish eradication projects, and post-project surveys.

2. Support Transport of Colorado Pikeminnow and Razorback Sucker above the Waterfall Barrier in the San Juan River

The NGS would provide funding (likely through National Fish and Wildlife Federation) to support agencies and organizations (e.g., Reclamation, Utah Division of Wildlife Resources, and NNDFW) to capture and transport Colorado pikeminnow and razorback sucker upstream of a waterfall barrier in the San Juan River arm of Lake Powell, which allows the fish access to habitat in the San Juan River. Currently, Reclamation is managing the implementation of the project with assistance from other state and tribal agencies. Funding to support the capture and transportation of these fish around this barrier would increase the number of potentially spawning fish in the San Juan River and serve as a mechanism to connect the river and lake below the waterfall with fish and habitat in the river upstream of the barrier.

For more than 20 years, a large waterfall (about 30 feet high) has existed in the San Juan River near Paiute Farms, Utah, where the river enters Lake Powell. The waterfall is present when Lake Powell reservoir elevations are below 3,660 feet amsl, which has been continuous since 2000, except for 1 month in 2011. This waterfall serves as a barrier to movement for all fish species. While the waterfall effectively keeps nonnative fish from moving upriver, it also prevents native fish, especially Colorado pikeminnow and razorback sucker, from moving back upstream after they have drifted over the waterfall as larvae, juveniles, or adults. Ryden and Ahlm (1996) identified this barrier as a major impediment to migrating fish. In the spring of 2016, Reclamation conducted a pilot program to relocate Colorado pikeminnow and razorback sucker over the waterfall using buckets to move tagged fish. Approximately 170 razorback suckers and 4 Colorado pikeminnows were translocated.

The collection and translocation would be implemented in approximately March, April, and June every year through 2020. The frequency, timing, or duration of fieldwork could be adjusted in coordination with USFWS to maximize the effectiveness of the translocation effort. The funding could be used to support staff time, travel costs, field equipment, tagging equipment, and holding and transportation of fish.

3.9.5.2.9 Federally Listed Plant Species

The effects of Proposed Action emissions on the Brady pincushion cactus, Fickeisen plains cactus, and Welsh's milkweed were analyzed in the NGS Near-Field ERA. The results of the ERA indicated the Proposed Action would result in HQs of 0.05 for exposure to maximum COPEC concentrations (Ramboll Environ 2016f); therefore, the ecological risk to these species would be "negligible" (Ramboll Environ 2016f). Navajo sedge was not specifically evaluated in the ERAs; however, it is reasonable to assume that the effects of NGS emissions on the Navajo sedge would be similar to the effects on other federally listed plant species.

No effects from continued STS operations and management near the Moenkopi Switchyard area on Fickeisen plains cactus or its habitat would occur, and ongoing effects would be inconsequential given the ongoing disturbance of this area and implementation of BMPs. As described in the NGS O&M Plan (SRP 2017d), BMPs for this species would reduce the likelihood of plant damage or crushing by requiring that biologically sensitive areas be marked and avoided, and that in these areas pre-activity surveys be conducted prior to vegetation management occurring in the BM&LP Railroad and transmission line ROW corridors. In addition, vehicle use would be restricted to existing roads in suitable habitat, and clean vehicle practices would be implemented to reduce the spread of noxious weeds and invasive plant species.

Effects from continued operations and maintenance of the STS and WTS would not result in any direct or indirect disturbance of potential Welsh's milkweed habitat. BMPs described above for Fickeisen plains cactus would also be implemented for Welsh's milkweed. Furthermore, the STS and WTS ROW corridors are altered and exhibit disturbance due to ongoing maintenance and vegetation management activities. Therefore, continued operations and management or vegetation management would have inconsequential effects on habitat within the STS and WTS ROW corridors for Welsh's milkweed. The effects of STS and WTS retirement would be the same as described for the No Action alternative for both Fickeisen plains cactus and Welsh's milkweed.

3.9.5.2.10 Navajo Nation Endangered Species

NGS and Associated Facilities

Continued operation of the NGS and associated facilities through December 2019 would not remove any habitat for NNE species. Although maintenance, repair, and replacement activities would occur less often, effects of noise, light, and other disturbance on special status species would not change appreciably from existing conditions during operations. The effects of demolition and decommissioning of NGS structures, buildings, the catenary system, and other facilities described in Section 2.4.1.1 for the Proposed Action would be the same as described for the No Action alternative.

In the ERAs, it was determined that the baseline conditions do not pose an unacceptable threat to terrestrial wildlife or their habitats. The ERAs also evaluated a scenario with the maximum output of the NGS combined with the baseline and the potential impacts on terrestrial wildlife. The ERAs determined the maximum output from the NGS through 2019 would not pose unacceptable risks on wildlife species or their habitat from constituents of primary concern (e.g., mercury, selenium, and other pollutants) (Ramboll Environ 2016a, 2016f). Impacts on special status plants resulting from NGS emissions were also analyzed in the NGS Near-Field ERA, which indicated the Proposed Action would result in HQs of 0.05 for exposure to maximum COPEC concentrations. Therefore, NGS emissions under the Proposed Action would not pose unacceptable risk to special status plants (Ramboll Environ 2016f).

KM

KM operations and retirement could indirectly affect bald eagles, ferruginous hawks, or golden eagles and are described in detail in the KM EA (OSMRE 2017) and summarized as follows. Mining activity would not likely affect the breeding behavior of these raptors because breeding occurs beyond the area in which disruption of breeding has been observed. Mining activity could disturb bald eagles, ferruginous hawks, or golden eagles that use the KM Permit Area, but they would likely avoid active mine areas and mining roads with frequent human activity. Bald eagles, ferruginous hawks, and golden eagles would most likely use areas with less human activity such as inactive mine areas, reclaimed areas, and areas outside the KM Permit Area. Vehicles and human activity could induce these species to exhibit agitated behavior or flush from a perch site. This could increase energetic demands but would not result in reduced fitness of individuals because of the limited frequency and duration of use of the analysis area. After mining ceased, noise and light pollution would decrease, reducing disturbance to special status species.

Continued mining would generally occur in previously disturbed areas, and removal of undisturbed habitat would be minimal. Any bald eagles, ferruginous hawks, or golden eagles occurring in mined areas would likely be displaced into surrounding undisturbed or reclaimed habitat, which would be a short-term minor effect until reclamation replaced most wildlife habitat and the prey base returned.

The effects on the northern leopard frog, alcove bog-orchid, and alcove death camas from reductions in stream baseflow associated with N-Aquifer pumping for the KM would be similar to those described above for the Navajo sedge.

STS and WTS on Navajo Tribal Trust Lands

No direct or indirect disturbance would result from ongoing inspection, maintenance, or repair of the STS and WTS during NGS operations. Bald eagles, ferruginous hawks, golden eagles, or desert bighorn sheep could be temporarily disturbed by helicopters during aerial inspections of the transmission line. Potential impacts on NNE species would be minimized through implementation of BMPs described in the NGS O&M Plan (SRP 2017d). As powerlines are replaced and maintained, installed equipment would meet the most current Avian Powerline Interaction Committee design standards related to raptor electrocutions and collisions. Aerial inspections of the STS and WTS have potential to disturb NNE species using the transmission line ROW corridors. However, aerial inspections are conducted infrequently (once per year for STS and once per 5 years for WTS), and the disturbance would be brief and unlikely to affect NNE wildlife species. In addition, vehicle use would be restricted to existing roads in suitable habitat, and clean vehicle practices would be implemented to reduce the spread of noxious weeds or invasive plant species that could degrade habitat quality for NNE species. Thus, impacts on NNE species resulting from STS and WTS maintenance activities would be inconsequential. The effects of STS and WTS retirement would be the same as described for the No Action alternative.

3.9.6 Cumulative Effects

Cumulative impacts are based on considerations of past, present, and reasonably foreseeable future actions and their potential effects on special status species in combination with the Proposed Action. Adverse effects of the Proposed Action would be imperceptible on the California condor, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, Brady pincushion cactus, Fickeisen plains cactus, Navajo sedge, bonytail, Colorado pikeminnow, humpback chub, and razorback sucker; therefore, cumulative effects on these species are not evaluated. Similarly, impacts from groundwater pumping for the KM on special status species would be imperceptible; therefore, cumulative effects from past, present, and reasonably foreseeable water supply actions are not evaluated.

Cumulative effects on special status species are analyzed for the following effects of the Proposed Action:

- Direct noise or light disturbance from NGS retirement activities on bald eagles, ferruginous hawks, golden eagles, and desert bighorn sheep
- Indirect noise or light disturbance from KM operations on bald eagles, ferruginous hawks, golden eagles, and desert bighorn sheep
- Indirect surface disturbance during mining at the KM on bald eagles, ferruginous hawks, golden eagles, and desert bighorn sheep

Actions considered in the analysis of cumulative effects on special status species are described in Section 3.2 and include the Lake Powell Pipeline Project and ranching and agriculture in and near the KM Permit Area.

Noise or light disturbance, as well as surface disturbance from KM operations in combination with resumed grazing in the KM Permit Area, could result in cumulative effects on bald eagles, ferruginous hawks, golden eagles, and desert bighorn sheep. Much of the habitat for these species in the KM Permit Area is disturbed or otherwise suboptimal, and wildlife is either acclimated to or avoids areas with frequent human activity. However, human activity associated with resumed grazing could further disturb bald eagles, ferruginous hawks, golden eagles, and desert bighorn sheep using the KM and surrounding areas and could add to habitat degradation in reclaimed or undisturbed areas. Reclamation of disturbed areas with grassland/shrubland species and cultural plantings in select areas would reduce these effects, resulting in short-term minor cumulative impacts that would not eliminate any of the currently documented species from the region.

3.10 Fish and Wildlife

This section describes the affected environment and environmental consequences for fish and wildlife in the analysis areas potentially affected by various components of the proposed Extension Lease. The analysis areas are presented first, followed by a description of the affected environment. This section concludes with environmental consequences describing the direct and indirect effects of the No Action and Proposed Action alternatives followed by cumulative effects. Special status fish and wildlife species are discussed in Section 3.9 and are not included in this section. As summarized in Section 3.1.1, because the KM has already undergone environmental compliance with OSMRE, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.10.1 Regulatory Framework

The Bald and Golden Eagle Protection Act of 1940 (16 USC 668–668c) prohibits taking eagles, their eggs, eagle parts, or their nests without a permit issued by USFWS. A "take" is defined as any of the following actions: to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb eagles. A recently clarified definition (72 FR 31132) explicitly defines disturbance and protects eagles from impacts of human-initiated activities primarily around active, alternate, and historic nest sites. The definition of "disturb" includes any activity that will cause or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

Migratory birds (including raptors) and active nests are protected under the Migratory Bird Treaty Act (MBTA) (16 USC 703–712). Under the MBTA, it is illegal to take any migratory bird, its eggs, its parts, or any bird nest except as permitted (such as waterfowl hunting licenses, falconry licenses, or bird banding permits) by USFWS. The definition of "take" under the act includes any attempts or acts of pursuing, hunting, shooting, wounding, killing, trapping, capturing, possessing, or collecting. Removal of active nests resulting in the loss of eggs or young is also prohibited (16 USC 703–712). In addition, EO 13186 directs federal agencies to develop a Memorandum of Understanding with USFWS to further implement the MBTA and promote the conservation of migratory bird populations.

The Navajo Nation's Title 17 (Subchapter 21) and 23 classifies terrestrial wildlife species as big game animals, waterfowl, small game animals, fur-bearing animals, game birds, raptors, invasive species, and endangered species. These criminal and civil codes also established regulations on unlawful take of these species. This title includes additional species-specific regulations such as the Bald and Golden Eagle Protection Regulations and Raptor Electrocution Prevention Regulations. Although the NGS, STS, and WTS are not subject to Navajo regulations under the Existing or proposed Extension Leases, effects on these fish and wildlife species are considered in this EA.

Information on federal and state regulatory requirements for special status species can be found in Section 3.9.1.

3.10.2 Overall Analysis Area

The overall analysis area for fish and wildlife consists of (1) areas potentially directly impacted by NGS, STS, and WTS operations and retirement activities; (2) areas potentially indirectly impacted by KM operations and retirement activities; (3) areas that may be directly impacted by NGS stack emissions; and (4) areas that may be indirectly affected by KM-associated groundwater pumping from the N-Aquifer. Ramboll Environ (2016f) evaluated the potential indirect effects of fugitive dust generated by the KM on fish and wildlife and concluded that the contribution of KM emissions would be negligible when added to NGS emissions; therefore, indirect effects of KM emissions are not discussed further in this section.

3.10.2.1 NGS and STS and WTS Analysis Areas

The analysis area for direct impacts from the Extension Lease on fish and wildlife is the NGS lease area, including the BM&LP Railroad ROW, lake pump facility and pipeline road to the NGS plant, ash (CCR) disposal area and road corridor, coal conveyor and associated facilities connecting the KM and NGS railroad, and the STS and WTS ROW corridors on Navajo Tribal Trust Lands, as described in Section 2.0 of the EA. The analysis area for direct effects of NGS withdrawals from Lake Powell on fish and wildlife is Lake Powell.

3.10.2.2 Direct Emissions Effects Analysis Areas

The potential impacts of NGS emissions and deposition through December 2019 were previously analyzed in the KM EA and BA for the KM 5-year Permit Renewal (OSMRE 2017; Stantec 2017). Section 3.9.1.3 describes the two ERAs conducted in support of the KM EA and the associated BA to evaluate the potential for adverse effects of NGS emissions. The NGS Near-Field ERA evaluated existing conditions and potential future environmental conditions in the vicinity of the NGS (Ramboll Environ 2016f). The ERA was conducted to specifically evaluate the potential risk in terrestrial and aquatic environments from exposure to chemicals dispersed from stack emissions and other NGS sources within the area estimated to be above the air deposition threshold protective of terrestrial and aquatic ecological endpoints (i.e., Near-Field deposition area) as identified by air dispersion modeling with consideration of Near-Field (existing conditions) soil, sediment, and water quality data (Ramboll Environ 2016f). The NGS Near-Field analysis area consists of a 20-kilometer (km) radius from the NGS facility that overlaps a portion of Lake Powell. The San Juan River and Colorado River (above and below Powell) are not included in the analysis area for general wildlife and fish because the Near-Field ERA determined there would be no impacts beyond 20 km (Ramboll Environ 2016f).

The ERAs evaluated both special status species (federally or state listed species) and non-special status species. Representative ecological receptors that have been observed or expected to occur locally or regionally were selected to evaluate the potential for adverse effects due to current and proposed future operation of the NGS and the KM. The biological organisms evaluated included terrestrial wildlife and soil communities (plants and soil invertebrates), aquatic-oriented wildlife, and aquatic communities (plants, invertebrates, and fish).

The analysis area for direct emissions effects is shown in Figure 13.

3.10.2.3 KM Analysis Area

The analysis area for indirect impacts from KM operations and retirement is the KM Permit Area shown on Figure 13.

3.10.2.4 KM Groundwater Pumping Analysis Area

The N-Aquifer analysis area occupies an area of approximately 10,400 square miles bounded on the north by the lower San Juan River, Lake Powell, and the Colorado River; on the east by Chinle Wash and Chinle Creek; and elsewhere by the outer limit of the N-Aquifer as shown in Figure 11. The analysis of impacts on baseflows in springs and seeps, stream channels, and ponds within the N-Aquifer analysis area that potentially support aquatic, wetland, and riparian habitat are discussed in Section 3.8.

3.10.2.5 Cumulative Emissions Analysis Area

For terrestrial wildlife resources, the cumulative effects analysis areas are the same as those described for the direct and indirect effects.

3.10.3 Affected Environment

3.10.3.1 Regionwide Biotic Communities

The NGS and the KM are located in the Colorado Plateau physiographic region. Major biotic communities include Great Basin conifer woodland, dominated by pinyon-juniper; Great Basin desert scrub, dominated by a variety of arid land shrubs; Plains and Great Basin grasslands, dominated by a mixture of perennial grasses and low shrubs; riparian communities, dominated by riparian woodlands and shrublands; and Colorado Plateau Mixed Bedrock Canyon and Tableland. These biotic communities represent the habitats for terrestrial wildlife species potentially occurring in the region. A variety of wildlife species are associated with these habitats, with greater species diversity occurring in areas exhibiting greater vegetation structure, soil moisture, and open water such as wetlands and riparian areas. Throughout the region, aquatic systems and associated riparian areas play a major role in maintaining biodiversity. Riparian communities provide migratory birds and pollinating insects and bats with vital travel corridors for their migrations between North America and South America (AGFD 2012a). Fish and wildlife species occurring in the analysis areas are described in the subsections below.

3.10.3.2 NGS and Associated Facilities

Wildlife habitat types associated with the NGS and associated facilities are detailed in Section 3.11, Vegetation. Big game species associated with these habitats include mule deer and, although uncommon, mountain lion. Common small game species found in the analysis areas include dove, turkey, coyote, and bobcat (AGFD 2015b; Reclamation 2007). Small mammal and reptile species potentially occurring in the NGS analysis area include ringtail, western spotted skunk (*Spilogale gracilis*), and numerous bat species including the Arizona myotis (*Myotis occultus*), fringed myotis (*Myotis thysanodes*), western pipistrelle (*Pipistrellus hesperus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), and pallid bat (*Antrozous pallidus*) (NatureServe 2017; NPS 2016; Reclamation 2007). Other common small mammals include desert cottontail (*Sylvilagus audubonii*), jackrabbit, Ord kangaroo rat (*Dipodomys ordi*), deer mouse (*Peromyscus maniculatus*), pocket mouse (*Chaetodipus* spp. and *Perognathus* spp.), and woodrat (*Neotoma* spp.) (NPS 2005). Common reptiles include the plateau striped whiptail lizard (*Cnemidophorus velox*), gopher snake (*Pituophis catenifer*), western rattlesnake (*Crotalus viridis*), desert spiny lizard (*Sceloporus magister*), and side-blotched lizard (*Uta stansburiana*) (NPS 2005).

The grassland and desert scrub habitats that dominate undisturbed areas of the NGS analysis area support a variety of migratory and resident birds, such as larks, hummingbirds, flycatchers, vireos, warblers, and buntings (Reclamation 2007). Raptor species associated with the NGS analysis area include northern harrier (*Circus cyaneus*), red-tailed hawk, ferruginous hawk, zone-tailed hawk (*Buteo albonotatus*), common black hawk (*Buteogallus anthracinus*), Harris' hawk (*Parabuteo unicinctus*), golden eagle (*Aquila chrysaetos*), and American kestrel (*Falco sparverius*) (Reclamation 2007). No raptor breeding or wintering Raptor Sensitive Areas, as designated by the Navajo Nation Department of Fish and Wildlife, have been identified within the analysis area on Navajo Tribal Trust Lands (Reclamation 2016b).

Lake Powell provides important aquatic habitats for migratory bird species in the region. Within the Lake Powell area, most shorebirds are summer residents (Reclamation 2007). Common shorebird species include western sandpiper (*Calidris mauri*), least sandpiper (*Calidris minutilla*), American avocet (*Recurvirostra americana*), long-billed dowitcher (*Limnodromus scolopaceus*), snowy egret (*Egretta thula*), and great blue heron (*Ardrea herodias*) (Reclamation 2007). Along the Colorado River corridor, the aquatic bird community is almost exclusively made up of winter residents (Reclamation 2007). Thirty-four species of wintering waterfowl along with loons, cormorants, grebes, herons, rails, and sandpipers use the Colorado River corridor (Reclamation 2007).

The canyon tree frog (*Hyla arenicolor*) is common along the shores of Lake Powell and relatively steep side canyons (Brennan 2008; Reclamation 2007). Other amphibian species that are known to occur around Lake Powell or the Colorado River include Woodhouse's toad (*Anaxyrus woodhousii*), red-spotted toad (*Anaxyrus punctatus*), Great Basin spadefoot (*Spea intermontana*), and tiger salamander (*Ambystoma tigrinum*). Woodhouse's toad and red-spotted toad generally are associated with riparian areas along the Colorado River in the spring and fall and use the shoreline area in the summer. The Great Basin spadefoot typically is associated with water tanks or wet ditches.

Fish species found in Lake Powell and their common and Latin names are shown in Table 28. Common nonnative fish species in Lake Powell include walleye, bluegill, green sunfish, carp, gizzard shad, and channel catfish (AGFD 2013; Reclamation 2007). Flannelmouth sucker, a native fish, potentially occurs in Lake Powell. Other native fish species are discussed in Section 3.9, Special Status Species. Nonnative fish species associated with the Lake Powell tributaries and inflow areas include fathead minnow, mosquitofish, red shiner, and plains killifish. The pelagic (open water) area of Lake Powell is dominated by striped bass and threadfin shad (Vatland et al. 2008). The occurrence of these fish species in the pelagic zone is characterized as concentrated abundance separated by expanses of habitat with few fish (Mueller and Horn 2004).

3.10.3.3 KM

Twenty-eight mammal species were recorded in the KM analysis area during 1979 to 1983 and 2003 wildlife studies and during 2008 monitoring (PWCC 1992; BIOME 2003; EMI 2009). Big game species, while present, are not abundant. During monitoring and other wildlife studies, elk (*Cervus canadensis*), mule deer, white-tailed deer (*Odocoileus virginianus*), bobcat (*Lynx rufus*), red fox (*Vulpes vulpes*), and coyote (*Canis latrans*) or their signs have been observed within the KM analysis area (EMI 2009, 2010). Increased elk presence has coincided with the increase in higher-quality reclaimed land vegetation within the KM analysis area.

Sagebrush shrublands and pinyon-juniper woodlands support the largest variety of mammal species. Deer mice (*Peromyscus maniculatus*) are one of the most common species observed in the KM analysis area, both in native and reclaimed lands. Also common are ground squirrels (*Ammospermophilus* spp.). Pinyon-juniper woodland supports pinyon-mice (*Peromyscus truei*), brush mice (*Peromyscus boylii*), Ord's kangaroo rat (*Dipodomys ordii*), Stephen's woodrat (*Neotoma stephensi*), and Colorado chipmunk (*Tamias quadrivittatus*). Black-tailed jackrabbits (*Lepus californicus*) and desert cottontails (*Sylvilagus audubonii*) occur in all habitats within the KM analysis area.

Bat studies were conducted in 1999 in reclaimed lands and pinyon-juniper within and adjacent to the KM analysis area (OSMRE 2011a). Nine bat species were identified including the big brown bat (*Eptesicus fuscus*), long-legged myotis (*Myotis volans*), silver haired bat (*Lasionyctris noctivagans*), pallid bat (*Antrozous pallidas*), fringed myotis, Mexican free-tailed bat (*Tadarida brasiliensis*), big free-tailed bat (*Nyctinomops macrotis*), canyon bat (*Parastrellus hesperus*), and an unknown myotis species. Only the first six species were found in the pinyon-juniper habitat, but all nine species were found on reclaimed lands.

Bird surveys have recorded 235 bird species in the lease area, more than half of which are known to or potentially nest in the area (LaRue 1994). The highest number of birds and the greatest diversity of species have been observed in summer, partly due to fledged offspring and species that are breeding residents only (LaRue 1994; BIOME 2003). Ongoing monitoring continues to document these trends (EMI 2016).

Raptor studies in the KM analysis area have recorded raptor species including red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), and American

kestrel (Ecosystem Management, Inc. 2015; OSMRE 2011a). Other less common species that may breed in the mine area include northern goshawk (*Accipiter gentilis*), prairie falcon (*Falco mexicanus*), western screech owl (*Otus kennicottii*), great horned owl (*Bubo virginian*us), northern pygmy owl (*Glaucidium gnoma*), and long-eared owl (*Asio otus*) (OSMRE 2011a). A historic red-tailed hawk nest remained inactive in 2003 (BIOME 2003). Four active red-tailed hawk nests were documented in the KM analysis area in 2015 (EMI 2016).

A high diversity of migratory waterfowl and shorebirds use many of the larger impoundment ponds in the KM analysis area. Mallard (*Anas platyrhynchos*) is likely the only nesting species, though redhead (*Aythya americana*), ruddy duck (*Oxyura jamaicensis*), and American coot (*Fulica americana*) also may nest in the vicinity (Corman and Wise-Gervais 2005). Many other species may use the ponds during migration such as the great blue heron (*Ardea herodias*), blue-winged teal (*Anas discors*), and American wigeon (*Anas americana*) (Corman and Wise-Gervais 2005). Killdeer (*Charadrius vociferous*) is the only shorebird that may nest in the KM analysis area (Corman and Wise-Gervais 2005).

Reptile and amphibian species observed in the KM analysis area include whiptail lizard (*Aspidoscelis* spp.), collared lizard (*Crotaphytus collaris*), sagebrush lizard (*Sceloporus graciosus*), fence lizard (*Sceloporus undulatus*), short-horned lizard (*Phyrnosoma douglassi*), side-blotched lizard (*Uta stansburiana*), gopher snake (*Pituophis melanoleucus*), western rattlesnake (*Crotalus viridis*), western spadefoot toad (*Scaphiopus hammondi*), Woodhouse's toad, and red-spotted toad (BIOME 2003; PWCC 1992).

Aquatic habitat within the direct impacts analysis area is limited to intermittent and ephemeral streams (described below for the N-Aquifer analysis area), springs, and temporary and permanent sediment impoundment ponds (Figure 11). The occurrence of fish species within the KM analysis area is limited to a few sediment ponds where fish may be present from unauthorized introductions. For example, sediment pond N14-G contains largemouth bass (*Micropterus salmoides*); however, no public fishing is allowed in the pond. Channel catfish (*Ictalurus punctatus*) were stocked in Cow Springs in 2015 by the Navajo Nation Department of Fish and Wildlife.

3.10.3.4 STS and WTS on Navajo Tribal Trust Lands

Terrestrial wildlife species potentially occurring in the WTS analysis area would be similar to those described for the NGS analysis area. The STS analysis area provides more diverse habitats than the other analysis areas because it crosses areas with more diverse hydrology, topography, and soils. Terrestrial wildlife species potentially occurring in the STS analysis area would generally be similar to those described for the NGS analysis area, with the addition of species associated with riparian vegetation. Riparian areas occur along STS stream crossings and provide potential habitat for birds such as flycatchers, vireos, warblers, orioles, buntings, and turkeys. In addition, the more diverse grassland and shrubland community types support a wider diversity of wildlife, such as javelinas (*Tayassu tajacu*), Gambel's quail (*Callipepla gambelii*), and nonnative chukars (*Alectoris chukar*).

The STS crosses Moenkopi Wash and the Little Colorado River at the southern end of the analysis area. These streams support aquatic invertebrates and also could support smaller sport fishes (Figure 11).

3.10.3.5 N-Aquifer Analysis Area

Intermittent streams and springs in the N-Aquifer analysis area (Figure 11) include Moenkopi Wash, Dinnebito Wash, Oraibi Wash, Wepo Wash, Polacca Wash, Chinle Wash, Jeddito Wash, Begashibito Wash, Shonto Wash, Laguna Creek, and Cow Springs. Several of the streams such as Moenkopi Wash, Dinnebito Wash, Shonto Wash, Laguna Creek, and Cow Springs contain water on a more consistent basis as a result of spring input and could provide habitat for fish. If present, species could include

mosquitofish (*Gambusia affinis*), western killifish (*Fundulus zebrinus*), or other species that are adaptable to waterbodies with minimal flow and higher water temperatures.

3.10.3.6 Ecological Risk Assessment Analysis Areas

3.10.3.6.1 Terrestrial Wildlife

The NGS Near-Field analysis area consists primarily of the Colorado River, Lake Powell, and the surrounding undeveloped, high-altitude desert (Ramboll Environ 2016f). Wildlife habitat types associated with the NGS and associated facilities are detailed under Section 3.8, Vegetation. Important wildlife habitat found within this analysis area includes associated aquatic habitats of Lake Powell within the NGS Near-Field study area. Approximately 80 species of mammals, 35 species of reptiles and amphibians, and 200 species of birds are in the Lake Powell area (NPS 2005).

Upland wildlife species in the NGS Near-Field analysis areas are similar to those described above for the NGS analysis area. Common waterfowl of Lake Powell include American widgeon, northern pintail, bufflehead, common goldeneye, common merganser, green-winged teal, lesser scaup, eared grebe (*Podiceps nigricollis*), and mallard (Reclamation 2007). The majority of these species are winter residents or spring and fall migrants. Raptors occurring near Lake Powell and the Colorado River corridor include bald eagle, peregrine falcon (*Falco peregrinus*), and osprey (*Pandion haliaetus*) (Reclamation 2007).

Lake Powell provides important aquatic habitats for migratory bird species in the region. Within the Lake Powell area, most shorebirds are summer residents (Reclamation 2007). Common shorebird species include western sandpiper (*Calidris mauri*), least sandpiper (*Calidris minutilla*), American avocet (*Recurvirostra americana*), long-billed dowitcher (*Limnodromus scolopaceus*), snowy egret (*Egretta thula*), and great blue heron (*Ardrea herodias*) (Reclamation 2007). Along the Colorado River corridor, the aquatic bird community is almost exclusively made up of winter residents (Reclamation 2007). Thirty-four species of wintering waterfowl along with loons, cormorants, grebes, herons, rails, and sandpipers use the Colorado River corridor (Reclamation 2007).

ERA methods and baseline COPEC concentrations are described in Section 3.9. Overall, key chemicals are detected at low concentrations and are dispersed throughout the NGS analysis area with no distinct patterns of occurrence. The complete results are provided in the NGS Near-Field Sampling Investigation Report (Ramboll Environ 2016g). Based on evaluation of risk, refined HQs for all of the terrestrial wildlife receptors were less than 1 for all COPECs for baseline conditions within the NGS Near-Field analysis area, indicating that risks to terrestrial wildlife species from baseline conditions are negligible.

3.10.3.6.2 Fish

Fish habitat in the NGS Near-Field analysis area includes Lake Powell and the Colorado River within a 20-km radius of the NGS. These waterbodies would not likely be directly impacted by disturbance from the Proposed Action but may be directly impacted by coal combustion at the NGS and, therefore, are considered in this EA. Native and nonnative fish species occurring in the ERA analysis areas are shown below in Table 28.

Table 28. Native and Nonnative Fish Species Occurring in the NGS Near-Field Analysis Area.

Common Name	Scientific Name	Lake Powell	Colorado River
Black bullhead	*Ameirus melas*	X	X
Black crappie	*Pomoxis nigromaculatus*	X	X
Bluegill	*Lepomis macrochirus*	X	X
Bluehead sucker	*Catostomus discobolus*		X
Brown trout	*Salmo trutta*		X
Carp	*Cyprinus carpio*	X	X
Channel catfish	*Ictalurus punctatus*	X	X
Fathead minnow	*Pimephales promelas*	X	X
Flannelmouth sucker	*Catostomus latipinnis*	X	X
Gizzard shad	*Dorosoma cepedianum*	X	X
Green sunfish	*Lepomis cyanellus*	X	X
Largemouth bass	*Micropterus salmoides*	X	X
Mosquitofish	*Gambusia affinis*	X	X
Northern pike	*Esox lucius*		X
Plains killifish	*Fundulus zebrinus*	X	X
Rainbow trout	*Oncorhynchus mykiss*	X	X
Red shiner	*Notropis lutrenis*	X	X
Redside shiner	*Richardsonius balteatus*		X
Roundtail chub	*Gila robusta*		X
Sand shiner	*Notropis stramineus*		X
Smallmouth bass	*Micropterus dolomieui*	X	X
Striped bass	*Morone saxatilis*	X	X
Walleye	*Sander vitreus*	X	X
Yellow bullhead	*Ameiurus natalis*	X	X

Source: OSMRE 2017.

ERA methods and baseline COPEC concentrations are described in Section 3.9 and Ramboll Environ (2016a, 2016f). Potential risk to aquatic species from existing chemical exposure was evaluated quantitatively in the NGS Near-Field ERA (Ramboll Environ 2016f). Results of the baseline risk assessment are summarized as follows in the Near-Field ERA (Ramboll Environ 2016f):

- All dissolved and total surface water HQs using maximum COPEC concentrations were below 1 with the exception of aluminum. HQs using the 95 percent UCL concentrations for both dissolved and total aluminum in surface water were below 1.
- All sediment HQs using maximum COPEC concentrations were below 1 for all COPECs.
- Modeled critical body residues (CBR) HQs were below 1 for early life-stage and adult fish using maximum refined or average concentrations of COPECs.
- Measured CBR HQs were below 1 for adult fish using maximum, refined, or average concentrations of COPECs.
- Maximum, refined, and average HQs using maximum COPEC concentrations and NOAEL TRVs were below 1 for all aquatic-oriented COPEC/receptor combinations.

These results suggest that surface water and sediment in the NGS Near-Field analysis area do not pose an unacceptable risk to benthic and aquatic invertebrates and aquatic plants and indicate that conditions in the NGS Near-Field analysis area do not pose a risk to fish populations (Ramboll Environ 2016f).

3.10.4 Environmental Consequences

3.10.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017, and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.

3.10.4.1.1 NGS and Associated Facilities

Demolition and decommissioning of structures, buildings, the railroad catenary, and other facilities described in Section 2.4.1.1 would result in short-term (2 to 3 years) habitat degradation or removal, but these impacts would be negligible due to the lack of undisturbed habitat in the areas, duration of disturbance, and implementation of BMPs described in the O&M Plan (SRP 2017d). The operator would coordinate with USFWS and the federal land manager to assure compliance with the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act, as appropriate, if any raptor nests were found on system infrastructure and needed to be removed. Destruction of or disturbance to any active nests found in the analysis areas would be avoided. Construction and vehicle use in riparian areas would further minimize impacts on migratory birds and other wildlife. Speed limits on access roads would minimize vehicular collisions with wildlife. Where NGS facilities were removed, habitat would be improved or restored in the long term after reclamation and revegetation was complete.

Demolition, decommissioning, and reclamation activities would increase noise and light pollution, resulting in slight, short-term effects on wildlife, lasting until reclamation activities were complete. Limited disturbance would continue during long-term monitoring activities.

The impacts of pumping water to the NGS on aquatic species were previously analyzed by the NPS in 2005 (NPS 2005). Effects from reducing NGS withdrawals from Lake Powell are described in Section 3.8.3.1. When the NGS ceases to operate, water requirements at the plant would be 5 to 10 percent of the amount that the NGS has historically used from Lake Powell. After demolition and earthmoving activities are completed, NGS water withdrawals from Lake Powell would cease. Reducing NGS withdrawals from Lake Powell would result in a slight increase (about 0.3 percent) in storage volume and surface area. The Lake Powell storage volumes fluctuate seasonally and from year to year, depending on inflow and dam releases (Reclamation 2016b). The lake pool elevation can rise more than 10 feet over a short period. The mean and maximum depths are 132 and 560 feet, respectively. Any reductions in terrestrial wildlife habitat from increases in storage volume at Lake Powell would be negligible. The increase in storage volume could also increase available habitat for aquatic species and increase dilution of contaminants, but these effects would likely be imperceptible.

There would be no effect of NGS emissions on fish and wildlife under the No Action alternative, because coal combustion would cease in December 2017.

3.10.4.1.2 KM

Reclamation at the KM would include revegetation of previously disturbed areas. Restored habitat in reclaimed areas would result in beneficial effects on fish and wildlife. These areas would be monitored twice annually for a period of 10 years for establishment of seeded vegetation and control of noxious weeds. Some groundwater pumping would occur for reclamation. Based on groundwater monitoring of the N-Aquifer, water withdrawal has not had substantial impacts on riparian areas downstream of the KM

Permit Area. During reclamation, the rate of pumping would be reduced, allowing recovery of water levels.

3.10.4.1.3 STS and WTS on Navajo Tribal Trust Lands

Retirement of the STS and WTS would result in removal of tower structures and conductors, decommissioning of communication facilities, restoration of the lands, and modification of access roads in some locations, which could result in noise disturbance to wildlife or surface disturbance of habitat. Disturbance would be temporary and would occur primarily in developed areas or areas where disturbance is ongoing. Disturbance would be limited to modification of portions of the access roads, and storage and staging areas. Retirement activities (Section 2.4.3 would include BMPs to minimize effects transmission line retirement. Additional protective measures would be implemented where appropriate to ensure compliance of retirement activities with the MBTA. Therefore, STS and WTS retirement would not result in any appreciable effects on fish and wildlife. If STS and WTS operations and maintenance continued, the effects on fish and wildlife would be the same as described for the Proposed Action.

3.10.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. Impacts from these operations and retirement are discussed in the following sections.

3.10.4.2.1 NGS and Associated Facilities

Historical water delivery from Lake Powell would continue until operations ceased. Continued operation of the NGS and associated facilities through December 2019 would not remove any wildlife habitat. Maintenance, repair, and replacement activities would occur less often, slightly reducing effects of noise, light, and other disturbance on wildlife during operations. The effects of demolition and decommissioning of NGS structures, buildings, the railroad, and other facilities on wildlife, as well as effects of continued operation and maintenance of the STS and WTS, would be the same as described for the No Action alternative, and would be short-term and negligible to minor. The Proposed Action would not directly affect fish or other aquatic species because none of these species occur in the direct effects analysis areas and because the Proposed Action would not affect habitat for these species.

Under the Proposed Action, withdrawals from Lake Powell would continue for about 2 years. As described in Section 3.8, withdrawals by the NGS for water supply in 2018 and 2019 would result in a slight decrease (about 0.3 percent) in storage volume and surface area. Lake Powell storage volumes fluctuate seasonally and from year to year, and plants, wildlife, and fish are adapted to these changes. Any reductions in terrestrial or aquatic habitat due to reductions in storage volume at Lake Powell as a result of NGS withdrawals would not be measureable. Because the intake system is in a deep area of Lake Powell where fish population densities are low, there would be a slight effect of the water intake system on the entrainment or impingement of fish, as discussed in NPS (2007). After 2019, the effects of Lake Powell withdrawals on fish and wildlife would be the same for the Proposed Action and the No Action alternative, except that pumping would continue for 2 years. The indirect impacts of groundwater pumping of the N-Aquifer would also be the same for both alternatives, which is negligible.

Impacts of NGS emissions on fish and wildlife were evaluated in the ERAs for the Proposed Action, which are described in Section 3.9.5.2. The Near-Field ERA looked at a scenario with the maximum output of the NGS combined with the baseline and the potential impacts on terrestrial wildlife and non-special status aquatic species. It determined that the maximum output from the NGS over the 5-year renewal period would not pose unacceptable risks to wildlife species or their habitat or to aquatic species

or their habitat from constituents of primary concern (e.g., mercury, selenium, and other pollutants) (Ramboll Environ 2016a, 2016f).

3.10.4.2.2 KM

Reclaimed areas in the KM analysis area would be monitored twice annually for a period of 10 years to monitor the establishment of seeded vegetation and control noxious weeds. Indirect effects from KM operations and retirement on fish and wildlife are described in detail in the KM EA (OSMRE 2017) and summarized as follows. Continued mining would occur in previously disturbed areas designated by the new lease, and removal of undisturbed habitat would be minimal. Wildlife occurring in the affected CRAs would likely be displaced into surrounding undisturbed or reclaimed habitat, which would be a short-term minor effect until reclamation replaced most wildlife habitat. Where disturbance occurred in rocky terrain, habitat would be regraded to more gentle and rolling topography before reclamation, resulting in removal and replacement of that habitat type with early successional vegetation communities. Effects of noise, light, and other disturbance associated with mining activities could disturb wildlife that use the KM Permit Area, but wildlife would likely avoid active mine areas and mining roads with frequent human activity, instead using areas with less human activity such as inactive mine areas, reclaimed areas, and areas outside the KM Permit Area. Vehicles and human activity could induce raptors to exhibit agitated behavior or flush from a perch site. This could increase energetic demands but would not result in reduced fitness of individuals because of the limited frequency and duration of use of the analysis areas. After mining ceased, noise and light pollution would decrease, reducing disturbance to wildlife.

3.10.4.2.3 STS and WTS on Navajo Tribal Trust Lands

Continued operations and maintenance of the STS and WTS would not result in any direct or indirect disturbance to fish and wildlife, and ongoing existing effects would be negligible because BMPs, including avian collision and electrocution avoidance measures, would continue to be implemented, and no new construction would occur. Effects of transmission line or communication site operation and maintenance on fish and wildlife would be further minimized through the BMPs described above, as well as the BMP ensuring that installed transmission line equipment would meet the most current Avian Powerline Interaction Committee design standards to prevent bird electrocutions and collisions. As powerlines are replaced and maintained, installed equipment would meet the most current Avian Powerline Interaction Committee design standards related to raptor electrocutions and collisions. Aerial inspections of the STS and WTS have potential to disturb wildlife species using the transmission line ROW. However, aerial inspections are conducted infrequently (once per year for the STS and once per 5 years for the WTS), and the disturbance is brief and unlikely to affect wildlife. In addition, vehicle use would be restricted to existing roads in suitable habitat, and clean vehicle practices would be implemented to reduce the spread of noxious weeds or invasive plant species that could degrade habitat quality. Thus, impacts on fish and wildlife resulting from STS and WTS maintenance activities would be imperceptible. The effects of STS and WTS retirement on fish and wildlife would be the same as described for the No Action alternative.

3.10.5 Cumulative Effects

Cumulative impacts are based on considerations of past, present, and reasonably foreseeable future actions and their potential effects on fish and wildlife in combination with the Proposed Action. The effects of the Proposed Action on fish would be negligible and, therefore, would not contribute to cumulative effects. This section describes cumulative effects of the Proposed Action on wildlife.

Cumulative effects on fish and wildlife are analyzed for the following effects of the Proposed Action:

- Direct noise or light disturbance from NGS retirement activities on wildlife
- Indirect noise or light disturbance from KM operations on wildlife

- Indirect surface disturbance during mining at the KM on wildlife

Actions considered in the analysis of cumulative effects on wildlife are described in Section 3.2 and include the Lake Powell Pipeline Project and ranching and agriculture in and near the KM Permit Area.

Noise or light disturbance as well as surface disturbance from KM operations, in combination with resumed grazing in the KM Permit Area, could have cumulative effects on raptors and other migratory birds, small mammals, and large mammals. Much of the wildlife habitat in the KM analysis area is disturbed or otherwise suboptimal, and wildlife is acclimated to or avoids areas with frequent human activity. However, human activity associated with resumed grazing could further disturb wildlife using the KM and surrounding areas and could add to habitat degradation in reclaimed or undisturbed areas. Reclamation of disturbed areas of the NGS and KM analysis areas would be completed in accordance with permit requirements or lease agreements, resulting in short-term negligible to minor cumulative impacts that would not eliminate any of the currently documented species from the region. In addition, PWCC's weed-control measures and monitoring in KM reclaimed areas would reduce the potential for noxious weeds and nonnative invasive species establishment. With implementation of reclamation plans, weed-control measures, and monitoring, the cumulative effects of the Proposed Action, in combination with livestock grazing, on wildlife would be minor.

3.11 Vegetation

This section describes the affected environment and environmental consequences for vegetation in the analysis areas potentially affected by various components of the proposed Extension Lease. The analysis areas are presented first, followed by descriptions of the affected environment and the direct, indirect, and cumulative environmental consequences of the No Action and Proposed Action alternatives. Included in this section is a general discussion of noxious weeds in the analysis area and the potential impacts of the alternatives on noxious weed distribution. Special status plant species are discussed in Section 3.9. As summarized in Section 3.1.1, because the KM has already undergone environmental compliance with OSMRE, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.11.1 Regulatory Framework

Vegetation within the NGS and the KM is subject to a number of regulatory programs for vegetation management decisions. The regulatory framework and details of facilities and activities associated with vegetation management at the NGS are provided as part of Appendix 2 and the NGS O&M Plan (SRP 2017d). Similar information for the KM is provided in Section 3.8.1 of the KM EA (OSMRE 2017).

Information on federal and state regulatory requirements for special status plant species can be found in Section 3.9.1.

3.11.2 Analysis Area

The overall analysis area for vegetation is shown on Figure 14 and consists of (1) areas potentially directly impacted by NGS, STS, and WTS operations and retirement activities; (2) areas potentially indirectly impacted by KM operations and retirement activities; and (3) areas that may be indirectly affected by KM-associated groundwater pumping from the N-Aquifer. The cumulative effects analysis areas are the same as the analysis areas for direct and indirect effects.

The analysis area for direct impacts from the Extension Lease on vegetation is the NGS and associated facilities and the STS and WTS ROW corridors on Navajo Tribal Trust Lands. The analysis area for direct effects of NGS withdrawals from Lake Powell on vegetation is Lake Powell. The analysis area for indirect impacts from KM operations and retirement on vegetation is the KM Permit Area.

The N-Aquifer analysis area occupies an area of approximately 10,400 square miles bounded on the north by the lower San Juan River, Lake Powell, and the Colorado River; on the east by Chinle Wash and Chinle Creek; and elsewhere by the outer limit of the N-Aquifer as shown in Figure 11. The analysis of impacts on baseflows in springs and seeps, stream channels, and ponds within the N-Aquifer analysis area that potentially support aquatic, wetland, and riparian vegetation are discussed in Section 3.8.

The direct effects of Proposed Action emissions on special status plants were evaluated and determined to be negligible (see Section 3.9 and Ramboll Environ 2016f). Because the special status species discussed in Section 3.9 were selected as representative plant species for the EA, it is assumed that the effects of Proposed Action emissions on general vegetation would likewise be negligible. Therefore, the effects of NGS coal combustion on vegetation will not be discussed further in this section.

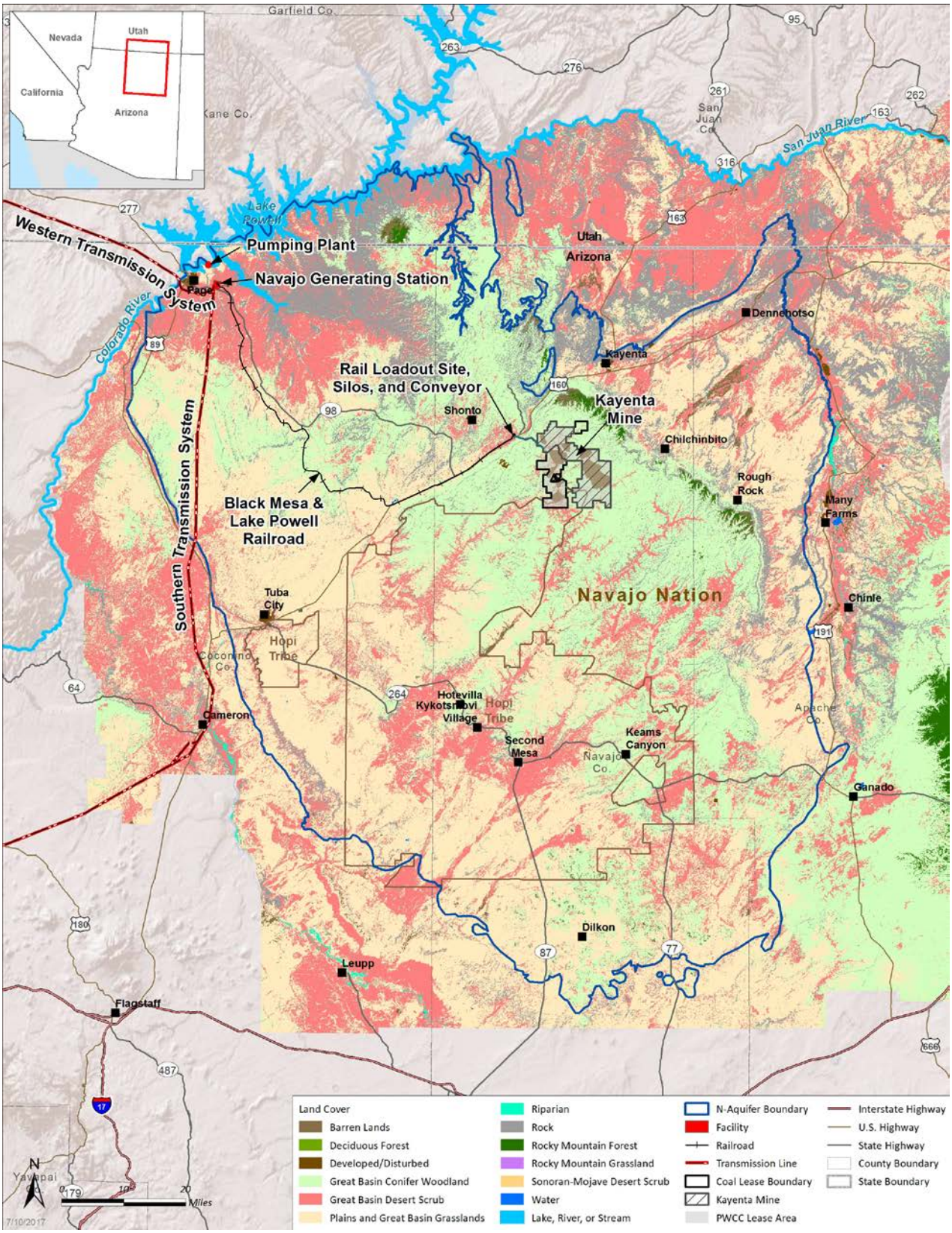

Figure 14. Land Cover.

3.11.3 Affected Environment

3.11.3.1 Regionwide Vegetation

The NGS and the KM are located in the Colorado Plateau physiographic region. The vegetation in the Colorado Plateau is adapted to cold temperate and arid to semiarid conditions. Major land cover types include Great Basin conifer woodland, dominated by pinyon-juniper; Great Basin desert scrub, dominated by a variety of arid land shrubs; and Plains and Great Basin grasslands, dominated by a mixture of perennial grasses and low shrubs. Other major cover types include exposed bedrock, barren lands, and developed/disturbed areas. Riparian/wetland areas, discussed separately below, cover only a small portion of the region and consist mostly of tamarisk (*Tamarix* spp.) shrub along major washes. Most of the region is dominated by native vegetation, with only a small portion being developed or disturbed.

Land cover types are divided into more detailed vegetative communities. The descriptions of vegetation communities and land cover types for this analysis presented below were based on the Southwest Regional Gap Analysis Project (SWReGAP) (USGS 2004, 2005). No field verification has been performed to determine the accuracy of SWReGAP data within the analysis area, although approximately 93,000 field samples were collected within the region mapped by the SWReGAP project to assist the land cover modeling effort (Lowry et al. 2005).

3.11.3.2 Riparian/Wetlands

Riparian areas are transitional areas between aquatic and upland habitat. They have distinctive vegetation communities related to increased availability of water from occasional to regular flooding and elevated water tables. Typical riparian areas occupy lakeshores and streambanks and include vegetation such as cottonwood (*Populus* spp.), tamarisk, and willow (*Salix* spp.). In the arid West, these areas generally have greater vegetation cover and productivity than upland areas. Wetlands are defined under Clean Water Act (CWA) Section 404 regulations as “those areas that are inundated or saturated by surface water or groundwater 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.” To be identified as a wetland, areas must exhibit hydrophytic vegetation, hydric soils, and wetland hydrology (U.S. Army Corps of Engineers 1987). The Section 404 regulations also cover surface water features that have a defined bed and bank and that have connectivity to other waters of the U.S. Projects that directly affect waters of the U.S., including wetlands, require permitting under Section 404 of the CWA.

3.11.3.3 Noxious Weeds and Invasive Species

Legally, noxious weeds are defined as any plant designated by a federal, state, or county government as injurious to public health, agriculture, recreation, wildlife, or property. Invasive species have similar ecological effects as noxious weeds but are not covered by existing regulations in the analysis area. Both noxious weeds and invasive species can outcompete native vegetation in areas of disturbance and can spread quickly in a short time.

The Federal Noxious Weed Act of 1974 (7 USC 28909) established a nationwide definition of noxious weeds. The Arizona Department of Agriculture, U.S. Department of Agriculture and Food, and BIA all have requirements for management of noxious weeds.

The state of Arizona designates noxious weeds under Arizona Revised Statute 3-201. Weeds that are not indigenous to the state and are likely to be detrimental, destructive, and difficult to control or eradicate may be listed as noxious by the state. Arizona-listed weeds are classified into prohibited, regulated, and restricted weeds (see the Arizona noxious weed list at https://plants.usda.gov/java/noxious?rptType=State&statefips=04). Prohibited species are quarantined from entry into the state. Regulated species means that any visible plant parts may be controlled to

prevent further infestation. Restricted means that any viable plant parts found within the state shall be quarantined to prevent further infestation.

The BIA Navajo Region currently is developing an integrated noxious weed management plan (BIA 2015), which contains a Noxious/Invasive Weed List.

Table 29 provides a list of noxious weeds that may occur within the area for each of the project components. Based on mapped distributions and habitats present, several species of noxious weeds and invasive plant species may occur at each of the facilities.

Table 29. Noxious Weeds and Invasive Plant Species.

Species	Arizona Weed Category	Known or Potential Occurrence[1]				
		NGS and Associated Facilities	BM&LP Railroad	KM	STS	WTS
Arizona Noxious Weeds						
Buffelgrass *Pennisetum ciliare*	Prohibited Regulated				Possible	
Camelthorn *Alhagi pseudoalhagi*	Regulated Restricted		Possible		Likely	Possible
Common purslane *Portulaca oleracea*	Prohibited Regulated	Possible	Possible	Known	Possible	Possible
Dalmatian toadflax *Linaria genistifolia* var. *dalmatica*	Prohibited Restricted					Possible
Diffuse knapweed *Centaurea diffusa*	Prohibited Restricted		Possible	Known		
Dodder *Cuscuta* spp.	Prohibited				Possible	Possible
Field bindweed *Convolvulus arvensis*	Prohibited Regulated	Possible	Known	Known	Likely	Likely
Halogeton *Halogeton glomeratus*	Prohibited Restricted	Possible	Possible	Known	Possible	Likely
Jointed goatgrass *Aegilops cylindrica*	Prohibited Restricted					Possible
Puncture vine *Tribulus terrestris*	Prohibited Regulated	Possible	Known	Known	Possible	Possible
Quackgrass *Elytrigia repens*	Prohibited Restricted				Possible	Possible
Russian knapweed *Acroptilon repens*	Prohibited Restricted	Possible	Known	Known	Likely	Likely
Scotch thistle *Onorpordum acanthium*	Prohibited Restricted	Possible	Known	Known	Possible	Known
Yellow starthistle *Centaurea solstialis*	Prohibited Restricted				Possible	Possible
Other Invasive Species						
African mustard *Brassica tournefortii*	NA				Likely	Known
Black henbane *Hyoscyamus niger*	NA					Likely
Bull thistle *Cirsium vulgare*	NA		Known	Known	Possible	Possible

Species	Arizona Weed Category	Known or Potential Occurrence[1]				
		NGS and Associated Facilities	BM&LP Railroad	KM	STS	WTS
Cheatgrass *Bromus tectorum*	NA	Likely	Likely	Known	Likely	Known
Kochia *Bassia scoparia*	NA	Likely	Known	Known	Likely	Likely
Malta starthistle *Centaurea melitensis*	NA					Likely
Musk thistle *Carduus nutans*	NA		Known	Known		Possible
Red brome *Bromus rubens*	NA					Known
Russian olive *Elaeagnus angustifolia*	NA			Possible		Possible
Prickly Russian thistle *Salsola tragus*	NA	Likely	Likely	Known	Likely	Likely
Tamarisk (salt cedar) *Tamarix* spp.	NA	Possible	Likely	Known	Likely	Known

NA = Not applicable.
[1] Center for Invasive Species and Ecosystem Health 2015; Howery 2009; OSMRE 2008, 2011.

3.11.3.4 NGS and Associated Facilities

3.11.3.4.1 General Vegetation

Major land cover types and vegetative communities found in the NGS analysis area and BM&LP Railroad ROW are shown in Table 30 and Table 31 and described below.

Table 30. Land Cover Types and Vegetative Communities within the NGS Analysis Area.

Land Cover Types	Vegetative Communities Associated with Land Cover Types: SWReGAP	Acres	Percent
Great Basin conifer woodland	Colorado Plateau pinyon-juniper woodland	64	3.1
Great Basin desert scrub	Colorado Plateau blackbrush-Mormon tea shrubland Intermountain Basins big sagebrush shrubland Intermountain Basins mixed salt desert scrub	677	33.5
Plains and Great Basin grasslands	Intermountain Basins active and stabilized dunes	46	2.3
Rock	Colorado Plateau mixed bedrock canyon and tableland	152	7.5
Water	Open water	2	<0.1
Developed/disturbed	Developed, open space – low intensity	1,082	53.4
Total[1]		**2,023**	**100**

[1] Totals may differ due to rounding.
Source: SWReGAP (USGS 2004).

Table 31. Land Cover Types and Vegetative Communities along the BM&LP Railroad.

Land Cover Types	Vegetative Communities Associated with Land Cover Types	Acres[1]	Percent
Great Basin conifer woodland	Colorado Plateau pinyon-juniper woodland Intermountain Basins juniper savanna	534	11.8
Great Basin desert scrub	Intermountain Basins big sagebrush shrubland Colorado Plateau blackbrush-Mormon tea shrubland	1,387	30.6
Plains and Great Basin grasslands	Intermountain Basins semi-desert shrub steppe Southern Colorado Plateau sand shrubland	2,377	52.4
Riparian	None	0	0.0
Rock	Colorado Plateau mixed bedrock canyon and tableland	50	1.1
Water	Open water	0	0.0
Developed/disturbed	Developed, open space – low intensity	188	4.1
Total[2]		**4,536**	**100.0**

[1] Based on a 250-foot buffer.
[2] Totals may differ due to rounding.
Source: SWReGAP (USGS 2004).

Great Basin conifer woodland

Great Basin conifer woodland consisting of Colorado Plateau pinyon-juniper woodland is found in 3.1 percent of the NGS analysis area. Great Basin conifer woodlands occur in Arizona at elevations of 3,400 to 8,800 feet above mean sea level (amsl) (Arizona Game and Fish Department [AGFD] 2012a). Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperm*a) are the common tree species. Common understory shrubs include big sagebrush (*Artemisia tridentata*), fourwing saltbush (*Atriplex canescens*), Mexican cliffrose (*Purshia mexicana*), Douglas rabbitbrush (*Chrysothamnus viscidiflorus*), and rubber rabbitbrush (*Ericameria nauseosa*) (Brown 1982). Grasses and forbs provide a small amount of cover with the most common of these being bottlebrush squirreltail (*Elymus elymoides* ssp. *elymoides*), Indian ricegrass (*Acnatherum hymenoides*), and muttongrass (*Poa fendleriana*) (Brown 1994).

Great Basin desert scrub

Great Basin desert scrub is found in 33.5 percent of the NGS analysis area and is the second most common land cover type. It includes three vegetative communities: Colorado Plateau blackbrush-Mormon tea shrubland, Intermountain Basins big sagebrush shrubland, and Intermountain Basins mixed salt desert scrub. Great Basin desert scrub occurs at elevations from 3,000 to 6,500 feet amsl in Arizona (AGFD 2012a). Vegetation is dominated by low-growing small-leaved grasses and shrubs including blue grama (*Bouteloua gracilis*), saltgrass (*Distichlis spicata*), needle-and-thread (*Hesperostipa comata*), big sagebrush, shadscale (*Atriplex confertifolia*), blackbrush (*Coleogyne ramosissima*), Mormon tea (*Ephedra viridis* and *E. torreyana*), fourwing saltbush, winterfat (*Krascheninnikovia lanata*), and rubber rabbitbrush.

Plains and Great Basin grassland

Plains and Great Basin grassland consisting of Intermountain Basins active and stabilized dunes is found in 2.3 percent of the NGS analysis area. Plains and Great Basin grassland cover occurs in Arizona from 5,000 to 7,000 feet amsl. Intermountain Basins active and stabilized dunes are unvegetated to moderately vegetated by species adapted to shifting coarse-textured substrates (usually quartz sand) and form patchy or open grasslands. Commonly occurring species include Indian rice grass (*Achnatherum hymenoides*), sand sage (*Artemisia filifolia*), big sagebrush, fourwing saltbush, rubber rabbitbrush, and antelope bitterbrush (*Purshia tridentate*).

Rock

The rock land cover type is found in 7.5 percent of the NGS analysis area. The only vegetative community within this land cover type is Colorado Plateau mixed bedrock canyon and tableland. This cover type includes barren and sparsely vegetated landscapes on cliffs, canyons, and open tablelands of mostly sedimentary rocks. The vegetation includes scattered trees and shrubs with a sparse herbaceous layer. Common species include pinyon pine, ponderosa pine (*Pinus ponderosa*), Utah juniper, and dwarf mountain mahogany (*Cercocarpus intricatus*).

Developed/disturbed lands

Developed/disturbed lands consisting of low-intensity open space occupy the majority (53.4 percent) of the NGS analysis area. The NGS plant site includes several associated facilities such as the ash (CCR) disposal area and road, lake pump facility, lake pump facility access road, and buried pipeline/powerline that contribute to this category.

BM&LP Railroad

Land cover types and vegetative communities found along the existing BM&LP Railroad are provided in Table 31. More than half of the land cover type found along the BM&LP Railroad consists of plains and Great Basin grassland. About 30 percent of the remaining land cover is Great Basin desert scrub.

3.11.3.4.2 Riparian/Wetlands

Based on available information, there are no riparian or wetland areas in the immediate vicinity of the NGS or associated facilities. The lake pump facility is located at the edge of Lake Powell.

Riparian vegetation is scarce at Lake Powell due to continuously fluctuating lake levels and upland desert vegetation extending to the water's edge (Reclamation 2007). Below the dam, riparian communities are dominated by tamarisk, arrowweed (*Pluchea sericea*), Gooding willow (*Salix goodingii*), coyote willow (*Salix exigua*), bulrush (*Scirpus acutus*), and Emery seepwillow (*Baccharis emoryi*) (Reclamation 2007).

No riparian/wetlands are present along the BM&LP Railroad (USGS 2004). However, aerial photographs show that 2 to 3 acres of tamarisk (invasive southwest riparian woodland and shrubland) are present at the crossing of Begashibito Wash outside of the 250-foot analysis area buffer.

3.11.3.4.3 Noxious Weeds and Invasive Species

No specific information is available on noxious weed occurrence at the NGS and associated facilities. Based on mapped distributions and habitats present, several species of noxious weeds and invasive plant species are possible or likely to occur at the NGS and associated facilities as noted in Table 30.

A number of noxious weeds and invasive plant species are known or likely to occur along the BM&LP Railroad as noted in Table 31. Noxious weeds known along the railroad corridor include puncture vine, Russian knapweed, and Scotch thistle. Invasive plant species known to occur along the railroad corridor include bull thistle, kochia, and musk thistle.

3.11.3.5 KM

3.11.3.5.1 General Vegetation

Table 32 displays land cover types and vegetative communities within the KM analysis area. The land cover types of the KM are primarily Great Basin conifer woodland and Great Basin desert scrub, with areas of riparian vegetation and open water. A reclaimed plant community occurs where previously mined areas have been backfilled or graded, topsoil added to the surface, and revegetated (Table 32).

Table 32. Land Cover Types and Vegetative Communities within the KM Analysis Area.

Land Cover Types	Vegetative Communities Associated with Land Cover Types	Acres	Percent
Great Basin conifer woodland	Colorado Plateau pinyon-juniper woodland	23,557	37.5
Great Basin desert scrub	Intermountain Basins big sagebrush shrubland	13,161	20.9
	Intermountain Basins mixed salt desert scrub	981	1.6
	Intermountain Basins greasewood shrubland	244	<1.0
Riparian	Invasive southwest riparian woodland and shrubland (tamarisk)	230	<1.0
Water	Open water	87	<1.0
Developed/disturbed	Disturbed/reclaimed[1]	979	<1.0
	Reclaimed	22,826	37.7
	Facilities	770	1.2
Total[2]		62,835	100.0

[1] Disturbed/reclaimed represents areas that are currently disturbed but likely to be reclaimed by 2019.
[2] Totals may differ due to rounding. Approximately 87 acres (0.1 percent) were not assigned a land cover type and are not included in table totals.
Source: BIOME (2003); Brown et al. (2007); SWReGAP (USGS 2004); ESCO Associates (2000a, 2000b, 2003, 2010).

The Great Basin conifer woodland occurs on approximately 38 percent of the KM analysis area. The composition of this land cover type is described in Section 3.11.3.4.1.

Developed/Disturbed

Within the analysis area, the disturbed land cover occupies approximately 24,575 acres, including the 12,200 acres of reclaimed land within the KM Permit Area. Vegetation cover in reclaimed lands is usually higher than in native vegetation types and other disturbed lands, averaging 23 percent (BIOME 2003; ESCO Associates 2000a, 2000b, 2003). Rock cover is low, but litter cover is high (BIOME 2003; ESCO Associates 2000a, 2000b, 2003). Native and introduced grasses and native shrubs dominate reclaimed lands in the KM analysis area. Cool-season native grass species include western wheatgrass (*Agropyron smithii*), thickspike wheatgrass (*Agropyron dasystachyum*), Indian ricegrass, needle-and-thread, big squirreltail (*Sitanion jubatum*), and bottlebrush squirreltail. Common warm-season native grass species include blue grama, galleta, and alkali sacaton (*Sporobolus airoides*). The most abundant introduced perennial grass species is Russian wildrye (*Elymus junceus*). Crested wheatgrass (*Agropyron desertorum*) and intermediate wheatgrass (*Agropyron intermedium*) also are present. Fourwing saltbush is the dominant shrub species, but several other species are common. Fourwing saltbush is long lived, spreads primarily by seed dispersal, and could slowly spread into reclamation areas from adjoining plant communities (U.S. Department of Agriculture [USDA] Natural Resources Conservation Service [NRCS] 2011). Several noxious weeds occur primarily in newer reclamation areas including kochia (*Kochia scoparia*), Russian thistle (*Salsola iberica*), and cheatgrass (*Bromus tectorum*).

Great Basin desert scrub

Great Basin desert scrub is found in approximately 22.5 percent of the KM analysis area. It includes three vegetative communities: Intermountain Basins greasewood shrubland, and Intermountain Basins mixed salt desert scrub.

More than 90 percent of the Great Basin desert scrub in the KM analysis area is sagebrush shrubland. Sagebrush shrubland occupies 20.9 percent of the KM analysis area. This community occurs on deeper soils that develop in flatter areas and in valley bottoms. Total vegetation cover is often less than 20 percent with low rock cover and sparse understory vegetation (Brown 1994). Sagebrush shrubland usually occurs up to 7,000 feet (2,134 meters) in elevation on Black Mesa. Above that elevation, it often is interspersed with pinyon-juniper woodland. Sagebrush shrubland is dominated by big sagebrush and blue grama (Brown 1994). Other common shrub species include fourwing saltbush, Douglas rabbitbrush,

Greene's rabbitbrush (*Chrysothamnus greenei*), and rubber rabbitbrush (Brown 1994). Blue grama and galleta are the common warm-season grasses in this plant community. Cool-season grasses are less common and include big squirreltail, bottlebrush squirreltail, needle-and-thread (*Stipa comata*), Indian ricegrass, and western wheatgrass.

Saltbush and greasewood shrublands

Saltbush and greasewood shrublands are two additional upland shrub communities that occupy relatively small, linear areas along washes in the KM analysis area. These shrublands grow on the margins of terraces associated with the higher-order drainages. The terraces typically lie 5 to 20 feet above a wash channel where saline-alluvial soil has accumulated. Fourwing saltbush dominates the saltbush community, and greasewood (*Sarcobatus vermiculatus*) dominates the greasewood community (Brown 1994). Annual forbs and grasses form sparse to dense understories (Brown 1994).

Numerous species of native plants found in the KM analysis area have cultural significance to the Hopi and Navajo people for use as food or medicine, use in rituals, and other uses such as tools, construction, and baskets. Cultural uses of plants can be identified in printed sources such as Mayes and Lacy (2012), Rainey and Adams (2004), and OSMRE (2017).

Approximately 475 acres of cultural plant sites have been established since 1994 on select sites within reclamation areas at the KM. These are developed in areas with a mesic aspect and on coarse-textured skeletal soils and rocky substrates similar to native areas supporting pinyon-juniper woodland and historic cultural collection sites. These sites, combined with native shrubland and pinyon-juniper planting areas, will make up approximately 5 percent of the reclaimed lands (OSMRE 2011b).

3.11.3.5.2 Riparian/Wetlands

Riparian vegetation occurs along major drainages, forming linear bands of vegetation within the KM analysis area. These bands form patches that are typically 10 to 20 feet wide and from a few yards to more than 0.5 mile (800 meters) long. This vegetation occurs on the bottoms of the washes and typically occupies the depositional side of a channel. In the KM analysis area, surface water in riparian areas usually is ephemeral, but short reaches of intermittent streams are sometimes present.

Tamarisk dominates the riparian vegetation. Small amounts of greasewood and fourwing saltbush associate with tamarisk in drier areas. Coyote willow (*Salix exigua*) occurs with tamarisk in wetter areas. Herbaceous understory vegetation is limited and often consists of cheatgrass, European alkali grass (*Puccinellia distans*), stickseed (*Lappula occidentalis*), and desert seepweed (*Suaeda torreyana*).

Aquatic plants are limited to some impoundments in the KM Permit Area, which include freshwater ponds, sediment ponds, and internally draining ponds in reclaimed areas. Some of the larger impoundments have emergent wetland plants along the margin, including tamarisk, coyote willow, bulrush (*Zanichellia palustris*), pondweeds (*Potamogeton* spp.), and holly-leafed water nymph (*Najas marina*).

Table 33 is a summary of riparian vegetation underlain by the N-Aquifer. Most of the riparian woodland and shrubland communities are located along the lower portions of major washes, including Begashibito Wash, Moenkopi Wash, Dinnebito Wash, Oraibi Wash, Polacca Wash, Jeddito Wash, and Chinle Wash. Within the N-Aquifer, riparian/wetland areas were identified through a Geographic Information System (GIS) analysis using SWReGAP data, LANDFIRE data, and aerial photo interpretation (OSMRE 2017). Woodland riparian communities identified through aerial photo interpretation within spring groups that could be affected by water pumping (Spring Groups D, F1, and I) were prioritized and added to the total riparian acreage number within the N-Aquifer analysis area. Section 3.8, Water Resources, contains detailed information concerning the spring groups. Upland vegetation was not assessed within the N-Aquifer analysis area outside of the KM analysis area.

Table 33. Riparian and Wetland Vegetation Cover Types Relative to Upland Areas Underlain by the N-Aquifer.

Land Cover Types	Vegetative Communities Associated with Land Cover Types	Acres	Percent
Riparian	Invasive Southwest riparian woodland and shrubland (SWReGAP)	2,708	0.04
	Rocky Mountain lower montane woodland and shrubland (SWReGAP)	133	<0.01
	Riparian (LANDFIRE)	22,209	0.33
	Riparian (desktop aerial interpretation)	555	<0.01
Water	Open water	24,560	0.37
Uplands	—	6,602,430	99.25
Total		6,652,595	100.00

Source: USGS 2004; Reclamation 2016b.

3.11.3.5.3 Noxious Weeds and Invasive Plants

A number of noxious weed or invasive plant species are known or expected to occur in the KM analysis area. Potential noxious weeds include common purslane, diffuse knapweed, field bindweed, puncture vine, Russian knapweed, and Scotch thistle (BIOME 2003). Invasive species occurring or potentially occurring in the KM analysis area include tamarisk, bull thistle, musk thistle, kochia, Russian thistle, and cheatgrass (California Information Node 2010; ESCO Associates 2003; USGS 2004). These species, with the exception of tamarisk, are ubiquitous early successional invasive species found in newly reclaimed and disturbed areas that diminish as perennial vegetation develops and outcompetes these species. The vegetation management program includes monitoring and treating annual weeds (PWCC 2015a). Other areas with noxious weeds and invasive plants are mostly found along U.S. Highway 160 and Arizona Route 41; these could represent a source of weeds in the KM analysis area (California Information Node 2010; USGS 2007).

3.11.3.6 STS and WTS on Navajo Tribal Trust Lands

3.11.3.6.1 General Vegetation

The STS in the analysis area extends south from the NGS through the cold deserts of the Colorado Plateau to the southern boundary of the Nation. Nearly 50 percent of the land cover present along the STS is grasslands. The WTS in the analysis area extends a short distance from the NGS west to the Navajo Tribal Trust Lands border near Page, crossing mostly desert scrub vegetation typical of the Colorado Plateau.

Table 34 and Table 35 provide summaries of the land cover types and vegetation communities within 1 mile of each side of the STS and WTS, respectively, based on SWReGAP data (USGS 2004).The STS in the analysis area is more diverse because it covers a larger area with more diverse topography and soils. The WTS is less diverse and mostly crosses desert scrub habitat. The power line corridors were constructed and built approximately 40 years ago, and vegetation within the ROW corridor has been maintained to support low-growing grasses, herbaceous species, and shrubs.

Table 34. Major Land Cover Types and Vegetative Communities along the STS.

Land Cover Types	Vegetative Communities Associated with Land Cover Types	Acres[1]	Percent
Great Basin conifer woodland	Colorado Plateau pinyon-juniper woodland Intermountain Basins juniper savanna Colorado Plateau pinyon-juniper shrubland	7,271.0	5.8
Great Basin desert scrub	Colorado Plateau blackbrush-Mormon tea shrubland Intermountain Basins big sagebrush shrubland Intermountain Basins greasewood flat Intermountain Basins mixed salt desert scrub Colorado Plateau mixed low sagebrush shrubland	50,771.0	40.3
Plains and Great Basin grasslands	Intermountain Basins semi-desert grassland Intermountain Basins semi-desert shrub steppe Intermountain Basins shale badland Southern Colorado Plateau sand shrubland Intermountain Basins active and stabilized dune Invasive annual and biennial forbland	60,873.0	48.3
Riparian	Invasive southwest riparian woodland and shrubland	437.0	0.3
Rock	Colorado Plateau mixed bedrock canyon and tableland	6,681.0	5.3
Water	Open water	12.0	<0.1
Barren lands	Barren lands, nonspecific	14.0	<0.1
Developed/disturbed	Developed, medium – high intensity Developed, open space – low intensity	71.3	0.1
Total[2]		126,130.3	100.0

[1] Acres based on 2-mile-wide corridor centered on transmission line.
[2] Totals may differ due to rounding.
Source: SWReGAP (USGS 2004).

Table 35. Major Land Cover Types and Vegetative Communities along the WTS.

Land Cover Types	Vegetative Communities Associated with Land Cover Types	Acres[1]	Percent
Great Basin desert scrub	Colorado Plateau blackbrush-Mormon tea shrubland Intermountain Basins mixed salt desert scrub	846	77.4
Plains and Great Basin grasslands	Southern Colorado Plateau sand shrubland	168	15.4
Riparian	Invasive Southwest riparian woodland and shrubland	0	0
Rock	Colorado Plateau mixed bedrock canyon and tableland	79	7.2
Developed/disturbed	Developed, medium – high intensity Developed, open space – low intensity	0.38	0
Total[2]		1,093	100.0

[1] Acres based on 2-mile-wide corridor centered on transmission line.
[2] Totals may differ due to rounding.
Source: SWReGAP (USGS 2004).

Descriptions of Great Basin conifer woodland, Great Basin desert scrub, and Plains and Great Basin grassland land cover types are provided under Section 3.11.3.4.1.

Colorado Plateau mixed bedrock canyon and tableland is supported in the rock cover type, which occurs in 5.3 percent of the STS analysis area and 7.2 percent of the WTS analysis area. Developed/disturbed land cover represents 0.1 percent of the STS analysis area and 0 percent of the WTS analysis area. Two communities are included within developed/disturbed areas: medium to high intensity development and low intensity (open space) development. Less than 0.1 percent of the STS analysis area consists of barren lands.

Great Basin conifer woodland

Great Basin conifer woodland is found in 5.8 percent of the STS analysis area and is similar as described for the NGS analysis area, except that one additional community type is represented in the STS analysis area: -Colorado Plateau pinyon-juniper shrubland. This community type occurs in rocky slopes and mesa tops with shallow/rocky and shaly soils where vegetation is dominated by dwarfed pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*).

Great Basin desert scrub

The Great Basin desert scrub cover type occupies 40.3 percent of the STS analysis area and 77.4 percent of the WTS analysis area and is similar as described for the NGS analysis area, except that two additional community types are represented in the STS corridor: Intermountain Basins greasewood flat and Colorado Plateau mixed low sagebrush shrubland. Additional dominant species associated with these two community types include greasewood (*Sarcobatus vermiculatus*), black sagebrush (*Artemesia nova*), and Bigelow sage (*Artemesia bigelovii*).

Plains and Great Basin grassland

Plains and Great Basin grassland is found in 48.3 percent of the STS analysis area and 15.4 percent of the WTS analysis area. It includes six vegetative communities: Intermountain Basins semi-desert grassland, Intermountain Basins semi-desert shrub steppe, Intermountain Basins shale badland, Southern Colorado Plateau sand shrubland, Intermountain Basins active and stabilized dune, and invasive annual and biennial forbland. This is a perennial grass-dominated landscape with short- or mid-height grasses, including blue grama, sideoats grama (*Bouteloua curtipendula*), buffalo-grass (*Buchloe dactyloides*), Indian rice grass, galleta (*Hilaria jamesii*), prairie junegrass (*Koeleria macrantha*), alkali sacaton (*Sporobolus airoides*), and others. Shrubs are common, including fourwing saltbush, big sagebrush, winterfat, rabbitbrush, and prickly pear cactus (*Opuntia* spp.).

3.11.3.6.2 Riparian/Wetlands

Riparian areas make up less than 1 percent of the land cover located along both transmission lines and are dominated by tamarisk. Riparian land cover in the STS analysis area occurs along the crossings of Moenkopi Wash and the Little Colorado River at the southern end of the analysis area. In addition to tamarisk, species such as cottonwoods, Arizona sycamore (*Platanus wrightii*), Arizona walnut (*Juglans major*), velvet ash (*Fraxinus velutina*), box elder (*Acer negundo*), Goodding's willow (*Salix gooddingi*i), and netleaf hackberry (*Celtis laevigata* var. *reticulata*) are common.

3.11.3.6.3 Noxious Weeds and Invasive Species

A number of noxious weed and invasive plant species are likely to or may possibly occur along the transmission lines (Table 29). Noxious weeds that are likely to occur in the STS analysis area include camelthorn, field bindweed, Russian knapweed, cheatgrass, and red brome. Noxious weed species likely to occur in the WTS analysis area include field bindweed, halogeton, Russian knapweed, and Scotch thistle.

3.11.4 Environmental Consequences

This section describes the direct and indirect effects of the No Action alternative on vegetation, followed by the effects of the Proposed Action, and then the cumulative effects of the Proposed Action.

3.11.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017, and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the

foreseeable future as they have been historically. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.

3.11.4.1.1 NGS and Associated Facilities

Under the No Action alternative, no additional ground disturbance caused by operation and maintenance would occur at the NGS and associated facilities, and no direct effects on vegetation would occur. The majority of the operating and support facilities at the NGS would be dismantled and removed and the area reclaimed at the end of operations. Under the No Action alternative, up to 1,760 acres associated with the plant site and ash (CCR) disposal area would be reclaimed (additional acreage would be reclaimed if the Nation elects not to accept certain facilities such as the lake pump facility or other facilities). Demolition and decommissioning of NGS structures, buildings, the catenary system, and other facilities described in Section 2.4.1.1 could result in short-term (2 to 3 years) degradation or removal of vegetation communities. Where NGS facilities were removed, native plant communities would be improved or restored in the long term after reclamation and revegetation was complete. Following grading, where required, and redistribution of topsoil, the areas to be reclaimed would be revegetated with native plants (see Section 2.4.1.1). As discussed in Section 3.12.4.1.1, the most likely use for the NGS site after reclamation activities is industrial development. It is likely that traditional uses of the area, including grazing, would not be permitted at the NGS site in perpetuity. It is estimated that herbaceous species (e.g., grasses) would take 2 to 5 years to reestablish and achieve adequate ground cover to prevent erosion. Given the small proportion of reclaimed areas relative to surrounding undisturbed areas, effects on vegetation of converting the existing vegetation communities in the NGS analysis area to the reclaimed vegetation community would be long-term but inconsequential.

Initiating reclamation of NGS operating and support facilities could temporarily increase the number of vehicles entering and exiting the analysis area, which would indirectly increase the potential for noxious weed and invasive plant establishment in the short term.

With implementation of BMPs, the No Action alternative would result in slight long-term impacts. Disturbance of vegetation could also occur during long-term monitoring activities, but effects on vegetation would be negligible. As described in the O&M Plan (SRP 2017d), clean vehicle practices would be implemented to reduce the spread of noxious weeds or invasive plant species.

Effects from reducing NGS withdrawals from Lake Powell on special status species are discussed in Section 3.9 and would be similar for vegetation. After demolition and earthmoving activities are completed, NGS water withdrawals from Lake Powell would cease, resulting in a slight increase (about 0.3 percent) in storage volume and surface area. The Lake Powell storage volumes fluctuate seasonally and from year to year, depending on inflow and dam releases (see Section 3.8.3.1). Any changes in wetland or riparian vegetation from increases in storage volume at Lake Powell would be negligible.

3.11.4.1.2 KM

Under the No Action alternative, no mining would occur in the KM analysis area, and final reclamation would be initiated. Facilities not requested to be kept by the tribes would be removed, and the disturbed areas would be recontoured to conform to the natural landform, covered with topsoil, and revegetated. Mined areas would be reclaimed as rangeland consisting primarily of native species. Reclaimed areas would be dominated by grasses and shrubs, with scattered groupings of trees and plants of cultural significance to the Hopi Tribe (cultural plants). Over the long term, reclaimed vegetation in the KM analysis area would increase by about 6 percent. Given the relatively small proportion of reclaimed areas, converting mined areas to the reclaimed vegetation community would result in long-term negligible direct effects on vegetation in the KM analysis area.

In the short term, disturbed and reclaimed areas in the KM analysis area would be susceptible to invasion by noxious weeds and other invasive plant species from regrading, spreading topsoil, and reseeding areas disturbed by mining activities, as well as livestock grazing. Most of the weeds present in the KM analysis area are annual weeds, which compete poorly with established reclamation vegetation. Within the KM Permit Area, seed and mulch are specified to be free of noxious weeds. PWCC routinely controls diffuse knapweed by applying herbicides along roadsides. Prescriptions for reseeding, grazing, mowing, or using chemical control are made based on the results from statistical sampling of plots in reclaimed areas. Additionally, PWCC maintains a twice per year vegetation monitoring and weed program for 10 years after reseeding areas. This program identifies the measures to control noxious weeds that could establish in the KM Permit Area. With reclamation and mitigation efforts, potential establishment of invasive plant species or noxious weeds would be temporary and highly localized, resulting in minor impacts on vegetation.

Settling ponds, impoundments, and other erosion-control measures would prevent sediment loads in disturbed area runoff from adding to the naturally occurring sediment loads that could be deposited along areas of riparian vegetation within or downstream of the Dinnebito Wash, Moenkopi Wash, and Coal Mine Wash drainages. Impoundments developed in association with the Affected Coal Resource Areas and reclamation sites could augment the small number of riparian areas present at impoundments in previously mined areas in the KM Permit Area. The impacts on riparian vegetation from the various water impoundments would be negligible.

Groundwater monitoring of the N-Aquifer has demonstrated that water withdrawal has not had substantial impacts on riparian areas downstream of the KM Permit Area (LaRue 1994). Therefore, the indirect impacts of the No Action alternative on riparian vegetation from water withdrawal from the N-Aquifer for mining activities would be negligible.

3.11.4.1.3 STS and WTS on Navajo Tribal Trust Lands

Retirement of the STS and WTS would involve removal of tower structures and conductors, decommissioning of communication equipment, restoration of the lands, and modification of access roads, which could result in surface disturbance of vegetation. Disturbance would be temporary and would occur primarily in developed areas, previously disturbed areas, or areas where disturbance is ongoing. Disturbance would be limited to modifications of access roads and creation of storage and staging areas. The Retirement Actions described in Section 2.4.3 include measures to minimize effects of STS and WTS retirement and restoration and revegetation requirements. Therefore, STS and WTS retirement would not result in any appreciable effects on vegetation. If STS and WTS operations and maintenance continued, the effects on vegetation would be the same as described for the Proposed Action.

3.11.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. Impacts from these operations and retirement are discussed in the following sections.

3.11.4.2.1 NGS and Associated Facilities

Impacts of the Proposed Action on vegetation would be similar to No Action impacts, except that under the Proposed Action, the NGS and the KM would operate for 2 years prior to retirement.

Similar to the No Action alternative, in the Proposed Action, no additional ground disturbance would occur and no vegetation would be removed during continued operation of the NGS and associated

facilities through December 2019, with the exception of some possible vegetation removal or clearing for the new solid waste landfill. Some temporary degradation of vegetation could occur during ongoing maintenance, repair, and replacement activities, but these effects would be negligible because maintenance activities would occur less frequently than before in anticipation of facility retirement.

Coal dust generated during coal transport (i.e., along the BM&LP Railroad), handling, and storage could settle on vegetation, potentially resulting in a localized effect on plant health. The potential for untreated or improperly loaded coal to be lost due to wind erosion is greatest during the initial transport near the mine (Ramboll Environ 2016d). Potential impacts from fugitive dust under the Proposed Action would be minimized through the implementation of fugitive dust-control measures described in the NGS O&M Plan (SRP 2017d). Measures implemented to reduce coal blow-off during transport would include ensuring the coal remains below the top of the train cars during loading and enforcing slow train speeds. To further reduce the generation of coal dust, the NGS developed a Dust Control Plan that would continue to be implemented at the plant and associated facilities. In addition, an annual Fugitive Dust Control Report that describes actions taken to control dust, records of citizen complaints, and any corrective measures taken for the ash (CCR) disposal area also would be generated as required under coal combustion residual regulations (40 CFR Part 257.80). Based on implementation of these measures, dust-related effects on vegetation from operations and maintenance activities under the Proposed Action would be negligible.

Under the Proposed Action, withdrawals from Lake Powell would continue for about 2 years, but effects on vegetation would not change from existing conditions. Continuously fluctuating lake levels prevent the establishment of riparian vegetation (Reclamation 2007). Effects on vegetation from reducing NGS withdrawals from Lake Powell during NGS retirement would be the same for the Proposed Action and the No Action alternative. The indirect impacts on vegetation from groundwater pumping of the N-Aquifer would also be the same for both alternatives, which would be negligible.

3.11.4.2.2 KM

Continued mining would be limited to the KM Permit Area and would generally occur in previously disturbed areas, and removal of undisturbed habitat would be minimal. In the Proposed Action, mining would remove 842 acres (approximately 0.1 percent or less) of the existing pinyon-juniper woodland, saltbush and greasewood, and sagebrush shrubland vegetation types in the KM analysis area. However, mined areas would be reclaimed as rangeland consisting primarily of native species, as described above for the No Action alternative. Over the long term, reclamation and revegetation would increase the amount of reclaimed vegetation in the KM analysis area by about 6 percent. No mixed conifer or tamarisk riparian shrubland would be removed under the Proposed Action. The effect of converting the existing vegetation communities to the reclaimed vegetation community would be long term but negligible because the mined and reclaimed areas would consist of less than 1 percent of the plant communities in the KM analysis area.

The effects of the Proposed Action on vegetation in the NGS and KM analysis areas during reclamation would be the same as described for the No Action alternative. With ongoing reclamation and mitigation efforts, potential establishment of invasive plant species or noxious weeds would be temporary and highly localized, resulting in little impact on vegetation.

3.11.4.2.3 STS and WTS on Navajo Tribal Trust Lands

Under the Proposed Action, the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained as they have historically. Continued operations and maintenance of the STS and WTS would not result in any direct or indirect disturbance to vegetation, and ongoing effects would be negligible because no construction would occur and because most affected areas would already be disturbed. Effects of transmission line or communication site operation and maintenance on vegetation

would be minimized through the BMPs described in the O&M Plan (SRP 2017d). In addition, vehicle use would be restricted to existing roads in suitable habitat, and clean vehicle practices would be implemented to reduce the spread of noxious weeds or invasive plant species that could degrade habitat quality. Thus, impacts on vegetation resulting from STS and WTS maintenance activities would be imperceptible. The effects of STS and WTS retirement would be the same as described for the No Action alternative.

3.11.5 Cumulative Effects

Cumulative impacts are based on considerations of past, present, and reasonably foreseeable future actions and their potential effects on vegetation in combination with the Proposed Action. This section describes cumulative effects of the Proposed Action on invasion by noxious weeds and other invasive plant species. All other effects of the Proposed Action on vegetation would be negligible and would not contribute to cumulative effects. Among the actions described in Section 3.2, only ranching and agriculture in and near the KM Permit Area, the Former Bennett Freeze Area Proposed IRMP, and the Land Management District 3 RMP are applicable to cumulative effects on vegetation.

Under the Proposed Action, disturbed and reclaimed areas in the overall NGS analysis area could be susceptible to establishment of invasive plant species or noxious weeds. Weed infestations have been facilitated by past livestock grazing, which continues in the KM analysis area after a brief moratorium. Historical and ongoing monitoring of reclaimed areas show reseeding is occasionally needed over about 10 percent of the reclaimed areas to meet KM permit conditions (OSMRE 2017). Reclamation of disturbed areas of the NGS and KM analysis areas would be completed in accordance with permit requirements or the Extension Lease, thereby reducing the cumulative impacts on vegetation over time. In addition, PWCC's weed-control measures and monitoring in KM reclaimed areas would reduce the potential for noxious weeds and nonnative invasive species establishment. The Former Bennett Freeze Area Proposed IRMP and Land Management District 3 RMP could increase noxious weed populations from increases in disturbance, development, and grazing. With implementation of reclamation plans, weed-control measures, and monitoring, the cumulative effects of the Proposed Action, in combination with other reasonably foreseeable future actions, would be minor.

3.12 Land Use and Recreation

This section describes the affected environment and environmental consequences for land use in the analysis areas potentially affected by various components of the proposed Extension Lease. The regulatory framework and analysis areas are presented first, followed by a description of the affected environment. This section concludes with environmental consequences describing the direct and indirect effects of the No Action and Proposed Action alternatives, followed by cumulative effects. As summarized in Section 3.1.1, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

Land uses include residential, livestock grazing, and recreation in and around the NGS and associated facilities, the KM, and the transmission systems and communication sites. Recreation includes tourism at local attractions, hunting, fishing, hiking, and other activities that are important to the culture and economy of northeastern Arizona.

3.12.1 Regulatory Framework

3.12.1.1 NGS

Land uses at the NGS, including operations, the disposal of CCR, and pipeline and transportation ROWs, are subject to a number of federal regulations described in Appendix 2; Section 3.7, Solid and Hazardous Waste; and Section 3.13, Public Health and Safety. The NGS operations regarding land use are subject to the terms of the Existing Lease. Reclamation of landfill sites is subject to requirements in the Existing Lease (see Section 3.11, Vegetation). ROWs for pipelines, roads, and the railroad are subject to the terms of the Existing Lease and § 323 Grants for the NGS and associated facilities (see Section 1.1, Background). The Existing Lease requires that the Lessees remove any improvements not specified to be retained by the Nation, take all precautions to prevent unsafe conditions, and restore the NGS site as closely as possible to the original condition (see Section 1.1, Background).

3.12.1.2 KM

The KM is subject to the following regulations:

- The environmental effects of coal mining in the U.S. are regulated under SMCRA (30 USC Section 1265). Depending on the date that mining began in a given area, one of several regulations is applicable.
- Reclamation and release of reclaimed land from regulatory authority are controlled under Pre-Law regulations, administered under Initial Program regulations (30 CFR Part 710 to 725), or governed by Permanent Program regulations (30 CFR Part 810 to 828).
- SMCRA regulations do not require that Pre-Law lands receive reclamation or regulatory release from bonding or permit coverage; however, the lease for the KM requires grading and seeding of Pre-Law lands.
- SMCRA requires mining companies to post a reclamation performance bond sufficient to cover the cost of reclaiming the lands covered by the SMCRA Permanent Program permit (SMCRA 2009).

3.12.1.3 STS and WTS on Navajo Tribal Trust Lands

The STS and WTS on Navajo Tribal Trust Lands are subject to all applicable regulations under the Existing Lease and § 323 Grants for the STS and WTS (see Section 1.1, Background).

3.12.2 Analysis Area

The analysis area for land use includes the NGS, the KM, and the STS and WTS on Navajo Tribal Trust Lands (see Figure 15 and Section 1.1, Background). The NGS and the STS and WTS subject to the Extension Lease are located within Navajo Tribal Trust Lands in Coconino County. The KM Permit Area is located on Navajo and Hopi Tribal Trust Lands within Navajo County. The study area for recreation is the viewshed surrounding project facilities, meaning the area where the NGS and its emissions, STS and WTS, or KM may be observed.

Direct effects are considered within the footprint of the NGS and the STS and WTS, where effects on land use as a result of the alternatives would occur. Indirect effects are considered within the KM Permit Area and the ROW for the coal conveyor (and associated equipment), because they would occur in a different location with different timing and are subject to separate environmental compliance and approval from OSMRE. The cumulative effects analysis area includes the areas identified above and recreational areas near Page, as well as Class I and sensitive Class II areas located within the region (see Figure 3 in Section 3.3, Air Quality).

3.12.3 Affected Environment

The primary land uses in the direct and indirect analysis areas include traditional uses such as livestock grazing and dispersed residential (OSMRE 2017). The area is sparsely populated with scattered residential dwellings and small communities or chapters. Small retail shopping centers, roadside vendors, and gas stations are located along major transportation routes and near or in local communities (see Section 3.15, Socioeconomics and Environmental Justice).

3.12.3.1 NGS and Associated Facilities

3.12.3.1.1 Land Use

About 3,507 acres are occupied or disturbed within the Existing Lease area (see Table 36). Access to the NGS is by federal, state, and Nation roads. The NGS is approximately 3 miles east of Page, Arizona, within the LeChee Chapter of the Nation (see Chapter 2, Description of Alternatives; and Section 3.7, Solid and Hazardous Waste, for a detailed description of the NGS and associated facilities).

Solid and hazardous waste disposal facilities include a closed 13-acre solid waste landfill, a 3-acre asbestos landfill, and a 765-acre ash (CCR) disposal area (see Section 3.7, Solid and Hazardous Waste, and Table 36). These disposal facilities are closed to the public and are used solely by the NGS. The asbestos landfill and ash disposal area are permitted and regulated by the EPA (see Section 3.7, Solid and Hazardous Waste).

The lake pump facility is on Navajo Tribal Trust Lands and NPS ROW. The lake pump facility encompasses approximately 4 acres. The pipelines and power lines associated with the lake pump facility are within a 3-mile-long (9-acre) ROW that connects the NGS to the lake pump facility at Lake Powell. The 80-mile (1,520-acre) BM&LP Railroad is operated and maintained by the NGS with the sole purpose of transporting coal from the Coal Loading station to the NGS (see Chapter 1, Purpose and Need).

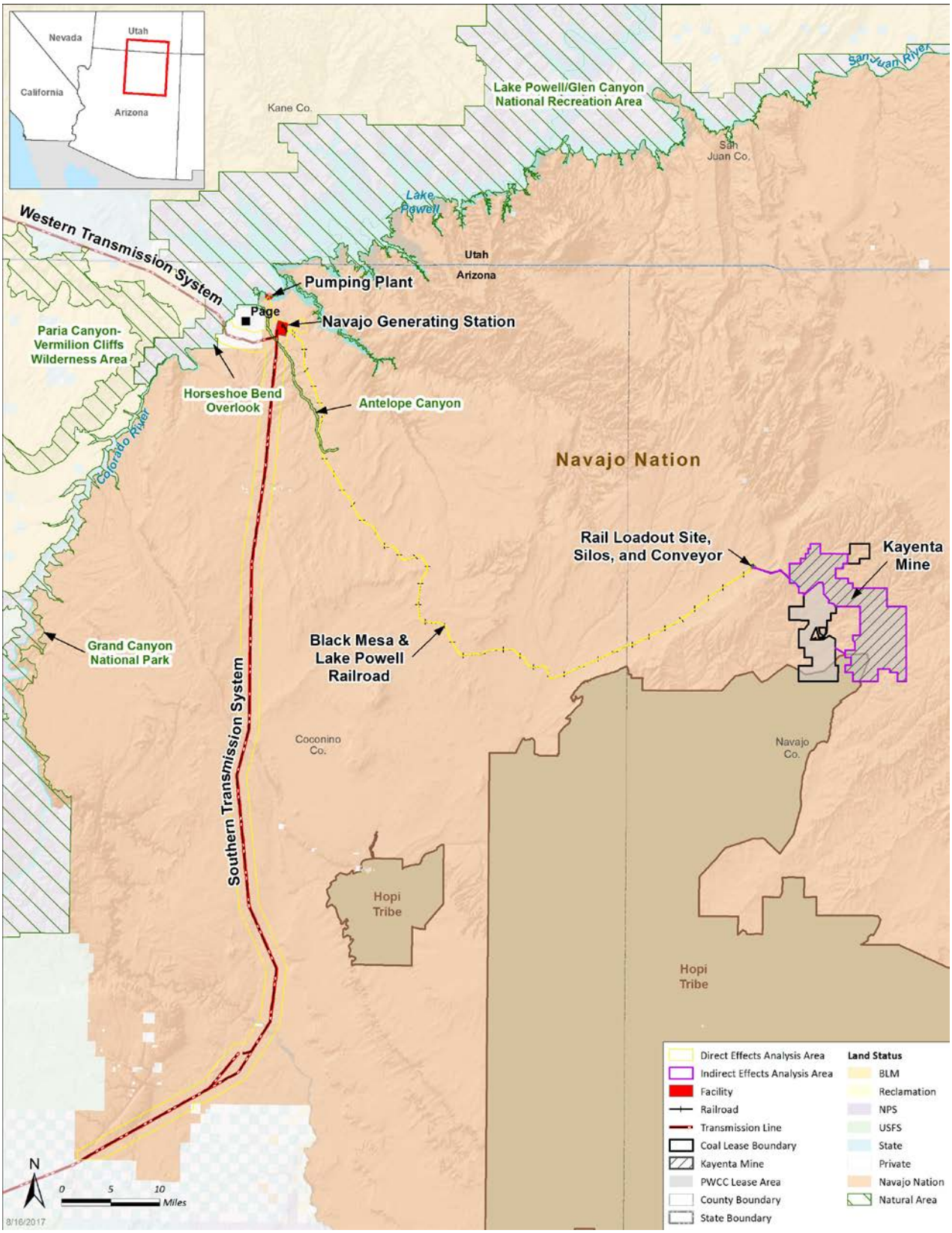

Figure 15. Land Use.

Table 36. NGS Acreage.

NGS and Associated Facilities	Acres
Plant site (excluding STS and WTS; including communication sites and solid waste and asbestos landfills)	965
Ash disposal site	765
Road between plant site and ash disposal area	30
Lake Pump Station 4.47	4
Road between Lake Pump Station and N228	3
Piping and road between plant and Lake Pump Station	40
Power line to Lake Pump Station	9
Coal conveyor from mine to loading station	66
Coal loading station near the mine	100
Railroad path	1,520
230-kV tie line	1
Preston Mesa Communication Site	<1
Zilnez Mesa Communication Site	2
Jack's Peak Communication Site	<1
Total	**3,507**

The LeChee Community-Based Land Use Plan has identified the development of community resource facilities, housing, and infrastructure as priority land use (LeChee 2004). LeChee Chapter community development objectives related to land use include enhancing rangelands to support livestock grazing, and designing water capture systems for farming and domestic use. Other Nation chapters and on- and off-reservation communities near the NGS are listed in Table 37. For social and demographic characteristics of these communities, see Section 3.15, Socioeconomics and Environmental Justice.

Table 37. Communities Near the NGS and Associated Facilities, STS, WTS, and the KM.

Chapter/District/Community
Black Mesa Chapter
Chilchinbeto Chapter
Chinle Chapter
Coppermine Chapter
Forest Lake Chapter
Inscription House Chapter
Kaibeto Chapter
Kayenta Chapter
LeChee Chapter
Pinon Chapter
Shonto Chapter
Tonalea Chapter
Tuba City Chapter
Hopi Reservation
City of Page, Arizona

3.12.3.1.2 Recreation

Recreation near the NGS includes hiking, hunting, canyoneering, jeep tours, and swimming. A large number of visitors travel to Lake Powell, Glen Canyon National Recreation Area, Horseshoe Bend Overlook, the Antelope Canyon Tribal Park, and the Grand Canyon each year. The tourism industry is a large contributor to the economy of Page, Arizona. Antelope Canyon Tribal Park, located immediately to the south of the NGS on Navajo Tribal Trust Lands, is a popular tourist destination. Several Nation-owned tourism businesses that offer guided tours of Antelope Canyon are located along Highway 89 near the entrance to the NGS. Antelope Canyon is the most visited and most photographed slot canyon in the

Southwest (Atlas Obscura n.d.). The landscape surrounding the NGS is known for its slot canyons, but recreational access to these areas is not permitted for non-tribal members without a Navajo guide. The NGS is visible from Lake Powell and the Antelope Canyon Tribal Park.

The Vermilion Cliffs National Monument and Paria Canyon–Vermilion Cliffs Wilderness Area are west of the NGS on BLM land. The monument is approximately 280,000 acres and is bounded on the north, east, and south by the 112,500-acre Paria Canyon–Vermilion Cliffs Wilderness Area. The monument and wilderness area offer visitors the opportunity to experience towering cliff walls streaked with desert varnish, huge red rock amphitheaters, sandstone arches, wooded terraces, and hanging gardens. This wilderness area also contains archaeological sites. Other regional recreation areas include several national monuments, national parks, and designated recreation areas (see Figure 3 in Section 3.3, Air Quality).

3.12.3.2 KM

3.12.3.2.1 Land Use

The 44,073-acre KM is located approximately 15 miles south of Kayenta, Arizona, in Navajo County on the Hopi Reservation and the Navajo Nation chapters of Chilchinbeto, Forest Lake, Kayenta, and Shonto (PWCC 2005a) (Figure 15). The coal conveyors and associated equipment are located north of the KM on Navajo Tribal Trust Lands. Native undisturbed areas exist within the KM and adjacent to the conveyors, where mining has not taken place or facilities are not located. These areas consist primarily of pinyon-juniper woodland, sagebrush shrubland, and reclaimed lands (see Section 3.11, Vegetation; OSMRE 2017). Land uses in the KM include dispersed residential, livestock grazing, and traditional cultural practices (such as hunting, gathering, plant and crop cultivation, and ceremonial uses).

Reclamation

Reclamation of mine areas is intended to achieve vegetation communities that support livestock grazing and wildlife habitat, the establishment of populations of culturally important plants, and pre-mine customary uses (see Section 3.6, Soils and Section 3.7, Vegetation). Affected lands are to be restored to their approximate shape and condition that existed prior to mining. Likewise, the vegetation communities affected by the KM are to be restored to similar seasonal variety, diversity, and plant composition (OSMRE 2017). After reclamation is complete at a site, the affected landscape is monitored for physical integrity and ecological health. Additional maintenance of reclaimed areas includes fencing and fence maintenance, drainage maintenance, and grazing management (OSMRE 2017).

Under 30 USC Section 1265(b)(16) and 30 CFR Part 816.100, reclamation is required to be initiated as close as practicable to the same period as the surface coal mining operations. Typically, the amount of time required for backfilling, topsoiling, and seeding is approximately equal to the time between initiating mining activities and initiating grading (OSMRE 2017). Factors that affect the mine reclamation schedule include annual mining operations, coal production requirements, and the availability of areas ready to be graded (PWCC 2012 et seq.).

Of the 19,330 acres of affected Pre-Law, Initial, and Permanent Program land at the KM, 14,546 acres have been backfilled and graded. Of those, 11,328 acres have been topsoiled and seeded, and 1,294 acres have been seeded without being topsoiled (Pre-Law reclamation). There are 2,450 acres that have been released through Termination of Jurisdiction, after successful completion of all reclamation activities; 3,710 acres that have been released from Phase I bonding after completion of backfilling and re-contouring of the mined area; and 3,694 acres that have been released from Phase II bonding after successful reestablishment of vegetation and soil productivity, and elimination of suspended solids from runoff in streams outside of the Permit Area. There are no lands for which Phase III bond release has occurred, which would require successful establishment of vegetation and full hydrological function (OSMRE 2009).

Residential Use

Within the KM area are 114 occupied single-family and extended-family households. Houses are dispersed and population sparse (OSMRE 2017). Individual land ownership is not part of the traditional Navajo and Hopi cultures. Families will often establish a customary use area claim, and the modern practice of permitted allotments is used as a land management strategy for grazing livestock on the Nation. Relocation of residents out of the KM disturbance area has occurred in the past, with residents being relocated to suitable locations and compensated for the replacement of all structures. Relocated residents are permitted to return to their original homesites after reclamation has been completed (PWCC 2015b; OSMRE 2011).

Livestock Grazing

Undisturbed and reclaimed KM land is used primarily for livestock grazing. While the area has historically been grazed year-round, this has proven to be unsustainable. The Navajo and Hopi practice sheep and cattle husbandry for consumption, income, and cultural purposes. The BIA issues grazing permits and manages rangeland health.

KM land is reclaimed with the objective of returning it to rangeland for local residents. Past reclamation efforts have included improvements to rangeland baseline conditions. Improvements include re-contouring areas with lower slopes to enhance water infiltration and forage production. Pastures have been seeded with forage species that are drought resistant and hearty, and have responded well in reclaimed areas in this region. Thirty-one sediment control ponds have been redesigned and are used as livestock watering sources. The KM reclaimed areas have produced greater yields of annual forage than the surrounding undisturbed areas; therefore, stocking rates have been higher on the reclaimed areas than on the native rangelands (OSMRE 2017).

Livestock grazing on reclaimed lands began in 1998 under a grazing plan to maximize rangeland health and ecological recovery. The establishment of cool season grasses successfully extended the grazing period throughout all seasons under non-drought conditions. Strategies for reducing grazing pressure on reclaimed areas include using water sources and mineral blocks to attract and contain livestock. PWCC provides sustainable rangeland management resources for permittees, maintains a holding pasture, and provides transportation for cattle to regional markets (PWCC 2005b, 2015c). Drought conditions and overgrazing resulting from unpermitted livestock and horses have compromised some reclaimed areas. In 2015, a temporary moratorium was placed on livestock grazing on KM reclaimed areas.

Traditional and Customary Land Uses

Historically, other land uses within the KM included hunting; gathering firewood (particularly pinyon and juniper) for cooking fuel and heat; cultivation of traditional food crops; and gathering of medicinal, food, and cultural plants. The Hopi and Navajo both grow corn and other crops in small (4 to 5 acres in size) unirrigated agricultural plots (PWCC 2016). Local residents are given access to wood from trees removed during KM activities and to coal produced at the mine to use as fuel sources (PWCC 2015b; OSMRE 2017).

There are over 100 documented plant species that have cultural significance for the Hopi and Navajo (Rainy and Adams 2004; OSMRE 2017). Culturally important plants have been reestablished in about 5 percent of the reclaimed area, with input from and in consultation with the Hopi Cultural Preservation Office, Black Mesa residents, Navajo medicine men and women, and herbalists (OSMRE 2017). New plant species are added to the list as necessary through ongoing consultation, and plants are collected from nearby reference sites. Cultural plant sites are continuously monitored to assess the success of site establishment, development, and successional change (PWCC 2012 et seq.).

3.12.3.2.2 Recreation

No developed recreation opportunities are available within the KM Permit Area. Dispersed recreation includes hiking, bird watching, and photography. Big game hunting is not permitted in the Black Mesa near the KM or where reclamation of the Black Mesa Mine is underway. Small game hunting is permitted north of the KM near the rim of Black Mesa (PWCC 2012 et seq.). Recreation is closed to non-tribal members without a valid permit issued by the Navajo Parks and Recreation Department and without a Navajo guide. Rock climbing, off-trail hiking, and off-road travel also are prohibited and considered trespassing (Discover Navajo 2015). The Navajo National Monument, which offers camping, hiking, and guided tours of archeological sites, is located about 10 miles north of the KM.

3.12.3.3 STS and WTS on Navajo Tribal Trust Lands

3.12.3.3.1 Land Use

STS and WTS

The STS and the WTS located within Navajo Tribal Trust Lands include a combined 103 miles of transmission line and 3,960 acres of ROW. The STS consists of two 500-kV transmission lines over approximately 101 miles and 3,919 acres of ROW. The WTS is a single 500-kV transmission line over approximately 2 miles and 41 acres of ROW.

Communication Sites

Three communication sites, two associated with the STS and one associated with the railroad, are located on Navajo Tribal Trust Lands and include less than 3 acres of land (Table 38). The areas around each site are cleared of vegetation periodically and are fenced for security purposes.

Table 38. Location and Size of Communication Sites within the Nation.

Site Name	Approximate Location	Jurisdiction	Acres	Service(s)
Jack's Peak	18 miles southwest of the NGS in rural Coconino County, Arizona	Nation	<1 (0.26)	STS, NGS
Preston Mesa	36 miles south of the NGS in rural Coconino County, Arizona	Nation	<1 (0.22)	BM&LP Railroad STS
Zilnez Mesa	40 miles southeast of the NGS in rural Navajo County, Arizona	Nation	2 (2.37)	BM&LP Railroad

3.12.4 Environmental Consequences

This section describes the direct and indirect consequences of the No Action alternative, followed by those of the Proposed Action, and then the cumulative consequences of the Proposed Action. The Proposed Action differs from the No Action alternative in that the NGS and the KM would operate between December 2017 and December 2019 prior to retirement activities. Therefore, the Proposed Action consequences would be those impacts related to the continued operation of the NGS, the KM, and the STS and WTS on Navajo Tribal Trust Lands, and to the implementation of the Extension Lease and specific land-use requirements stipulated therein.

3.12.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the

portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.

3.12.4.1.1 NGS and Associated Facilities

Land Use

The Lessees would work to negotiate and execute a separate access agreement with the Nation to allow for remediation and monitoring of the NGS for as long as needed after December 2020. The Lessees would undertake retirement activities of the NGS consistent with the Existing Lease with the Nation, which are described in the Retirement Actions (see Section 2.4.1.1). The Nation would retain the rights to selected NGS-related buildings.

It is unclear what the future land use at the NGS would be after retirement activities are completed, other than long-term monitoring and possibly remediation of portions of the area (see Section 2.4, No Action). The Nation would likely restrict land use to prohibit residential, agricultural, and most other uses where human exposure to contaminants could occur. The most likely use for the NGS plant site after reclamation activities is industrial development. It is likely that traditional uses of the area, including grazing, would not be permitted at the NGS in perpetuity (see Section 3.11, Vegetation). No future use of the ash (CCR) disposal area would likely be permitted.

The NGS plant area is 965 acres, and the ash (CCR) disposal area is 765 acres. These areas combined make up about 0.01 percent of the total Navajo Tribal Trust Lands area. The NGS and its associated facilities make up about 0.02 percent of the Navajo Tribal Trust Lands area. The duration of reclamation and monitoring and subsequent potential restricted uses of the leased areas would have long-term, both positive and adverse effects on land use within the Navajo Tribal Trust Lands. Navajo who have traditional ties to the area would be restricted from accessing it for many generations and would not be permitted to graze cattle and sheep there (see Section 3.14, Cultural Resources). Future industrial use of the previously disturbed area may be beneficial to the Nation’s economy and infrastructure (see Section 3.15, Socioeconomics and Environmental Justice).

Recreation

The removal of the NGS facilities would have a negligible long-term beneficial effect on the surrounding recreation economy. Upon removal, the NGS facilities would no longer be in the viewshed of Glen Canyon National Recreation Area and Antelope Canyon Tribal Park, which would result in a more aesthetic viewshed for recreationists. Some tourists who are deterred by the presence of an industrial facility may visit the area once the NGS facilities are removed.

The NGS retirement may have adverse effects on the local recreational economy. The loss of personal and family income for those who are employed directly or indirectly by the NGS may result in reduced ability for these employees and their families to participate in local recreation activities. Population and demographic changes resulting from the NGS retirement may affect recreation resources, as individuals and families move away from the area to seek employment elsewhere and the workforce is reduced. Local businesses that cater to tourism during the peak season (from about mid- to late-March through August) also benefit from out-of-town NGS contractors during the tourism off-season. These businesses provide important amenities that support the recreation economy, but they are also bolstered by local customers who have expendable income from the well-paying jobs at the NGS (see Section 3.15, Socioeconomics and Environmental Justice).

3.12.4.1.2 KM

Land Use

Following the cessation of mining activity, land would be reclaimed according to the provisions in the approved PAP and SMCRA regulations (SMCRA 2012; OSMRE 2017). The coal loading station and conveyor (166 acres; see Table 36) would be removed at the same time as the NGS retirement. Mined areas would be reclaimed according to the KM reclamation plan (OSMRE 2017).

According to SMCRA, alternative post-mining land uses (such as heavy or light industry and solar or wind power facilities) can be approved by OSMRE after the permittee has received written approval from the tribes (SMCRA 2012). Alternative post-mining land uses for the KM are at the discretion of the Nation and Hopi Tribe for their respective lands and can be revised under an active PAP at the tribes' request.

Planned post-mining land use specifies that facilities would be reclaimed unless they have been approved as a component of a post-mining land-use plan. Activities on the reclaimed mine areas under the No Action alternative include continued monitoring of mine reclamation, reseeding as needed, and repair of any erosional features that have developed on reclaimed areas. After reclamation, land use would be restored to the pre-mine uses discussed above. The No Action alternative would result in long-term beneficial effects on the residential and traditional uses of the area by the Navajo and Hopi communities.

Recreation

Dispersed recreational activities on Black Mesa would include the reclaimed areas within the KM. Local and transient wildlife populations may increase due to the lack of mining disturbance and successful reclamation as a result of the No Action alternative. Tribal members would be allowed to recreate on the reclaimed areas after closure. This would result in a long-term, beneficial effect on recreation resources.

3.12.4.1.3 STS and WTS on Navajo Tribal Trust Lands

It is likely the NGS Lessees and the Nation would enter a separate agreement for the continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands. The effects of an agreement to continue operation and maintenance of the transmission systems would be the same as described under the Proposed Action (see Section 3.12.4.2.3).

In the event an agreement cannot be reached, the 1,280 acres associated with decommissioning of the STS and WTS would undergo short-term disturbance while structures are removed and the area re-contoured and reseeded. Upon completion of retirement activities, all of the ROW would be returned to the Nation. After reclamation is complete and vegetation is successfully established, future use of the area may include livestock grazing and other traditional land uses. All three communication sites would be retired, and transmission-related equipment and infrastructure would be removed and disturbed areas reclaimed, but the sites would continue to be used by other agencies and companies. Long-term effects would be beneficial.

3.12.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019, and then the NGS facilities would be retired and the mine reclaimed. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. Impacts from these operations and retirement are discussed in the following sections.

3.12.4.2.1 NGS and Associated Facilities

Land Use

Under the Proposed Action, there would be no change to land use from the current conditions until after December 2019. Access to the site by the Lessees for long-term monitoring and remediation would be permitted until the Extension Lease expires in 2054. The associated facilities that the Nation elects to retain and portions of the leased lands and ROWs would be returned to the Nation upon completion of retirement by 2024.

The Extension Lease contains restrictive covenants that would limit the use of the waste disposal landfills located on the NGS after retirement and reclamation in order to protect human health and safety (see Section 2.3.1.3). The ash (CCR) disposal area, solid waste landfill, and pond solids areas would be capped, covered, and left in place. The covenants would limit the land use at these locations in order to prevent disturbance to the cover, liners, and containment components. These restrictions would be permanent, affecting a total of 644 acres. In addition to restrictive covenants, the Extension Lease and the § 323 Grant would require the Nation to conduct additional analysis and remediation if the areas are used for uses other than industrial purposes, in order to reduce risk to human health and public safety.

The area that would be subject to the restrictive covenants is about 0.003 percent of the total Navajo Tribal Trust Lands area. The NGS area that would be subject to restrictions under the Extension Lease and the § 323 Grants would be up to 0.02 percent of the total Navajo Tribal Trust Lands area. Reclamation, monitoring, and subsequent restricted uses of the leased areas would have long-term adverse and beneficial effects on land use within the Nation as a whole and on the local communities and chapters. Navajo who have traditional ties to the area would be restricted from accessing most of the NGS for many generations and would not be permitted to graze cattle and sheep there (see Section 3.14, Cultural Resources). The return of the NGS plant site and the retention of certain NGS buildings and facilities, as negotiated under the Extension Lease, would benefit the Nation and local communities by providing infrastructure for future industrial development (see Section 3.15, Socioeconomics and Environmental Justice).

Recreation

The effects on recreation resources would be the same under the Proposed Action alternative as under the No Action alternative, except that the timing of effects would coincide with the retirement and reclamation schedule for the Proposed Action.

3.12.4.2.2 KM

Under the Proposed Action, mining at the KM would cease around the end of 2019. Final reclamation would commence, and land would be reclaimed according to the provisions in the approved mine PAP and SMCRA regulations (OSMRE 2017). The effects would be the same as under the No Action alternative, except that mine closure and final reclamation activities would be delayed by 2 years, and the return of traditional land use would be similarly delayed 2 years.

3.12.4.2.3 STS and WTS on Navajo Tribal Trust Lands

Under the Proposed Action, the STS and WTS would continue to be operated and maintained for an additional 35 to 70 years (see Section 2.3, Proposed Action). The Extension Lease (and § 323 Grants) would allow the STS and WTS to continue to be operated and maintained through 2054 with an option to extend through 2089 or decommission by 2056. Reclamation would grant the Nation use and capacity of 300 MW on the STS and 200 MW on the WTS, with O&M costs paid by the Lessees for the first 10 years. After 10 years, the Nation would be responsible for their portion of the O&M costs for their use and capacity of the STS and WTS. The Lessees would be responsible for ultimate retirement and restoration after the lease expires. Jack’s Peak and Preston Mesa communication sites would continue to

be operated and maintained. The Zilnez Mesa site would be retired along with the NGS, unless the Nation chooses to retain the site.

There would be no changes from current conditions for 35 to 70 years under the Proposed Action. Upon expiration of the Extension Lease (or its renewal), 1,280 acres associated with the STS and WTS would undergo short-term disturbance while structures are removed and the area re-contoured and reseeded. Upon completion of retirement activities, the lands would be returned to the Nation. After reclamation is complete and vegetation is successfully established, future use of the area may include livestock grazing and other traditional land uses. Long-term effects would be beneficial.

3.12.5 Cumulative Effects

3.12.5.1 Glen Canyon Long-Term Experimental and Management Plan

The LTEMP would guide land use related to the management of the Glen Canyon Dam and would guide the management of ecological, cultural, and recreational resources in the area around Lake Powell and certain lands downstream of the dam. The LTEMP would improve conditions for reservoir and river recreation and guide land management to enhance cultural resources important to the Navajo and Hopi. The Proposed Action alternative when considered with the LTEMP effects on recreation and land use would result in beneficial long-term effects on the land use and recreation resources in the area. The Proposed Action would contribute negligibly to these effects.

3.12.5.2 Lake Powell Pipeline Project

Two segments of the Lake Powell Pipeline Project would be located in the existing utility corridor (approximately 500 feet wide) occupied by the WTS in Coconino County, Arizona. These would be outside of Navajo Tribal Trust Lands, but close to the NGS and within northeastern Arizona. Expansion of the utility corridor width may result in long-term effects on recreation resources as it may impact the viewshed from Lake Powell, as well as water-based recreation activities through the withdrawal of water. This effect would be short-term and adverse, and the Proposed Action would not contribute to adverse effects resulting from construction or operation of the pipeline.

3.12.5.3 Former Bennett Freeze Area Proposed IRMP and District 3 RMP

These plans would guide the land uses within the direct effects analysis area, with an emphasis on grazing management. The plans would result in long-term beneficial effects for Navajo communities by providing resources and management guidelines for sustainable rangeland management and economic development. Part of the STS is within District 3 and the Former Bennett Freeze Area near Tuba City. The Proposed Action would have a negligible cumulative effect during continued operation, maintenance, and eventual retirement of the STS.

3.13 Public Health and Safety

This section describes the affected environment and environmental consequences for public health, potential human health risks, and public safety in the analysis areas potentially affected by various components of the No Action and Proposed Action alternatives. The analysis areas and regulatory framework are presented first, followed by descriptions of the affected environment. This section concludes with environmental consequences describing the direct and indirect effects of the Proposed Action and No Action alternatives, followed by cumulative effects. As summarized in Section 3.1.1, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.13.1 Regulatory Framework

The NGS must comply with federal and, where applicable, state health and safety laws and regulations, but is not subject to tribal laws and regulations per a "Covenant Not to Regulate" in the Existing Lease. A similar covenant would also apply under the Extension Lease. As described in the KM EA (OSMRE 2017), the KM is subject to tribal laws and regulations regarding human health and public safety, as well as federal regulations.

3.13.1.1 Public Health and Human Health Risk Assessment (HHRA)

NEPA requires that an integrated analysis of health effects be addressed when an environmental impacts analysis is conducted if health impacts may be an issue. The public health and Human Health Risk Assessment (HHRA) evaluations fulfill this requirement.

The public health analysis follows National Research Council (National Research Council of the National Academies [NRC] 2011) and the North American Health Impact Assessment Practice Standards Working Group (2010) guidelines for assessing public health impacts of potential projects.

The HHRAs summarized in this section were conducted in accordance with standard Environmental Protection Agency (EPA) risk assessment methodology, including Risk Assessment Guidance for Superfund, Volume I (Parts A, B, E, and F) (EPA 2009a, 2004a, 1991, 1989) and the HHRA Protocol (HHRAP) for Hazardous Waste Combustion Facilities (EPA 2005). Additional guidance documentation includes the following:

- Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) (EPA 2010)
- Exposure Factors Handbook (EPA 2011b)
- EPA online regional screening levels – Users Guide (EPA 2014b).

3.13.1.2 Public Safety

Worker safety at the NGS and the KM is overseen by OSHA and MSHA, respectively. The Federal Energy Regulatory Commission (FERC) regulates the interstate transmission of electricity, and OSHA applies to the STS and WTS. OSHA has jurisdiction over most occupational health and safety issues within the state. Industrial construction and routine workplace operations are governed by OSHA standards of 1974, particularly 29 CFR Part 1910 (general industry standards). The MSHA standards of 1977 provide regulatory guidance on mining workplace safety thresholds. In addition, the NGS and the KM comply with U.S. Department of Transportation (USDOT)'s regulations related to hazardous materials and solid waste reporting. Evaluation of worker safety is not within the scope of this EA.

3.13.1.3 Industrial Noise

The EPA Noise Control Act of 1972 indicates that a 24-hour equivalent level of less than 70 decibels on the A-weighted scale (dBA) prevents hearing loss, and that a level below 55 dBA, in general, does not

constitute a major impact. Table 39 details the workplace protection measures provided per OSHA guidance against the effects of noise exposure.

Table 39. OSHA Workplace Permissible Noise Exposures.

Duration per Day (hours)	Sound Level (dBA)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

dBA = decibels on the A-weighted scale.
Source: OSHA 1974.

Regulation 30 CFR Part 816.67, overseen by the Office of Surface Mining Reclamation and Enforcement (OSMRE), regulates the control of effects resulting from blasting activity in terms of noise and vibration resources.

3.13.1.4 Hazardous Materials

Section 3.7 discusses the regulatory framework associated with solid and hazardous waste. The transportation of hazardous materials is subject to Arizona Department of Transportation (ADOT) and USDOT rules and regulations (see Appendix 2).

3.13.2 Analysis Area

The NGS and associated facilities are located on Navajo Tribal Trust Lands, and the KM is located on Navajo and Hopi Tribal Trust Lands. The public health evaluation and HHRA assesses the potential health impacts on the local population within a 50-kilometer (km) radius of the NGS with a quantitative evaluation of the 0–20 km zone and a qualitative evaluation of the 20–50 km zone.[30] The public safety analysis area for the NGS is the NGS with a 3-mile buffer. The analysis area for the KM is the KM Permit Area with a 3-mile buffer, inclusive of noise-sensitive receptors such as residences. The analysis area for the BM&LP Railroad and the 230-kilovolt (kV) and 500-kV STS and WTS transmission lines is 200 feet on either side of the BM&LP Railroad and the transmission lines. The analysis area for hazardous materials includes the NGS site, the KM Permit Area, and the major transportation routes used to deliver bulk products and chemicals to both facilities. The hazardous materials analysis area also includes the BM&LP Railroad ROW that extends from the KM to the NGS.

3.13.3 Overview

3.13.3.1 Public Health

Public health is the science of protecting and improving the health of families and communities through promotion of healthy lifestyles, research for disease and injury prevention, and detection and control of

[30] The 0–20 km zone contains the field sampling locations used for the baseline evaluation. Also, environmental medium concentrations (due to emissions and deposition caused by plant operations) predicted in the 0–20 km zone are much higher than those predicted in the 20–50 km zone.

infectious diseases. Public health is related to incidences and death rates for infectious and chronic diseases and other health conditions, including mental health.

The potential for health impacts associated with the Proposed Action is considered irrespective of the baseline environmental/community health conditions and geographic scope. Table 40 summarizes the approach to the public health evaluation. Information relevant for evaluating public health in the analysis areas was compiled and used as supporting documentation of health-related information throughout this section (Gradient 2016).

To assist in the qualitative assessment of impacts on public health, HHRAs can be conducted for defined analysis areas. HHRAs for the two analysis areas (NGS and KM) were performed as separate evaluations considering analysis area–specific receptors and sampling or modeling data. HHRAs for the health and public safety analysis areas evaluated baseline conditions (i.e., existing site conditions measured in 2014 and considered representative of historical operations through 2017) and the direct impact due to the Proposed Action at the NGS, indirect impact from the KM, and other cumulative sources.

Incremental upper-bound lifetime cancer risks and noncancer hazard indexes (HIs) for individuals who may reside, work, or recreate near the NGS and individuals who reside within and near the KM were estimated. The cumulative cancer risk estimates are compared to the EPA acceptable incremental risk range of 1×10^{-4} (one hundred in a million) to 1×10^{-6} (one in one million).[31] If estimated hypothetical cancer risks were within this range, then no further evaluation was required. The HQs for all COPCs were then summed to derive a HI. If the HI was less than 1, then the exposures were considered to be acceptable for noncancer risk, and no further risk calculations or evaluations were warranted.

The details of the HHRA methodology are provided in the NGS HHRA (Ramboll Environ 2016e) and the KM HHRA (Flatirons Toxicology Inc. 2016) conducted for the KM EA (OSMRE 2017).

3.13.3.2 Public Safety

For purposes of this analysis, public safety addresses the risks of direct public exposure to operational activities (e.g., blasting with potential noise and vibration effects), hazards associated with transportation of hazardous materials, and railroad and transportation safety.

[31] It is standard practice to express cancer risks in scientific notation. Scientific notation can be used to convert 0.0001 into 1×10^{-4} by moving the decimal place until you have a whole number between 1 and 10. If you keep moving the decimal place to the right four places in 0.0001, you will get 1. The number of places you moved the decimal point determines the negative exponent (E). In this case, the decimal point was moved four places to get to the whole number of 1 and can be expressed as 1×10^{-4}. A larger negative exponent indicates a smaller number, which is important when comparing cancer risks to the EPA acceptable risk range. For example, a cancer risk of 3×10^{-7} represents a number that is less than the risk range of 1×10^{-4} to 1×10^{-6} and is considered acceptable risk. A cancer risk of 4×10^{-3} represents a number that is greater than the risk range and is considered unacceptable risk.

Table 40. Summary of Public Health Approach: Health Categories Selected for Public Health Evaluation.

Potentially Affected Categories	Project Area	Project Specifics	Possible Health Impacts				
			Chronic Disease	Infectious Disease	Injury	Nutrition	Well-Being or Psychosocial
Environment	NGS	Stack emissions from NGS operations; secondary emissions and fugitive dust from plant and ash disposal area; diesel emissions from vehicle traffic	**(PN)** Inhalation of criteria and hazardous air pollutants	**(PN)** Inhalation of criteria and hazardous air pollutants	None	None	**(PN)** Inhalation of criteria and hazardous air pollutants
		Deposition impacts from air emission	**(PN)** Direct contact with hazardous pollutants	**(PN)** Direct contact with hazardous pollutants	None	**(PN)** Uptake of hazardous pollutants through consumption of livestock, fish, or garden/homegrown foods	**(PN)** Direct contact with hazardous pollutants
	KM	Fugitive dust and particulate emissions from bulk coal during mining operations; diesel emissions from vehicle traffic and machinery	**(PN)** Inhalation of particulate emissions	**(PN)** Inhalation of particulate emissions	None	None	**(PN)** Inhalation of particulate emissions
		Deposition impacts from air emission	**(PN)** Direct contact with hazardous pollutants	**(PN)** Direct contact with hazardous pollutants	None	**(PN)** Uptake of hazardous pollutants through consumption of livestock, fish, or garden/homegrown foods	**(PN)** Direct contact with hazardous pollutants
Economy (income, employment, and revenue)	NGS and KM	Local employment and funds to Navajo and Hopi	**(PP/PN)** Access to health care during NGS operation; decreased access to health care after retirement	**(PP/PN))** Access to health care during NGS operation; decreased access to health care after retirement	None	**(PP/PN)** Access to healthy foods during NGS operation; decreased access to healthy foods after retirement	**(PP/PN)** Job opportunities and revenue during NGS operation; reduced job opportunities and revenue due to shutdown
Public service and infrastructure	NGS and KM	None	None	None	None	None	None
Demographics	NGS and KM	Land-use patterns, and sensitive subpopulations	Negligible	Negligible	None	None	Negligible

(**PN**) Indicates selected for evaluation, possible negative effect.
(**PP**) Indicates selected for evaluation, possible positive effect.

3.13.4 Affected Environment

The HHRAs provide data and methods to evaluate the affected environment in terms of potential human health risk from baseline conditions. In accordance with standard risk assessment guidance and practice, these analyses focus on broad categories of potential health effects such as cancer and noncancer effects (Flatirons Toxicology Inc. 2016; Gradient 2016; Ramboll Environ 2016e). The human health risk estimates for baseline conditions for the NGS and the KM are summarized below. The potential exposures relative to human health related to the STS and WTS are also discussed.

The public health evaluation includes an assessment of the current public health conditions of the potentially affected community, including the existing environmental conditions and public health and safety resources within the community that could be affected by the proposed project.

The public safety and noise section evaluates human resources that could be affected by the historical noise and vibration environment near the NGS and the KM, which has been dominated by noise associated with mining and power plant operations.

The affected environment for hazardous materials and solid waste includes air, water, soil, and biological resources within the analysis area that could be affected by an accidental release of products, chemicals, hazardous materials, or solid wastes during transportation to or from the NGS and the KM, during transportation along the railroad ROW, or during on-site storage, disposal, or use.

3.13.4.1 NGS Baseline HHRA

Figure 16 shows the NGS and associated 50-km Near-Field analysis area for direct effects on human health. Based on the preliminary assessment of the surrounding community, along with information received from the Nation and EPA's HHRAP's recommendation, off-site residents, resident gardeners, the commercial workers, and the recreational users were considered in the baseline HHRA at the NGS.

Baseline conditions represent the existing on-the-ground environmental situation at the NGS, which includes the natural setting and any pollutants produced by past NGS operations since operation began and other local, regional, and global emission sources that have accumulated over time. The baseline risk assessment evaluated the potential human health risk due to the effect of these baseline conditions. For this analysis, the field sampling data measured in 2014 were used and considered representative of the on-the-ground baseline conditions including impacts from historical operations through 2017.

3.13.4.1.1 COPCs

COPCs identified for quantitative evaluation in the NGS Baseline HHRA included environmentally persistent pollutants typically emitted from coal-fired electric generating units based on two previous studies conducted by the Electric Power Research Institute (EPRI 2009, 2011), and the coal composition data collected during the KM Sampling Investigation in 2014 (Ramboll Environ 2016g). The COPCs quantitatively evaluated in the NGS Baseline HHRA included metals, polychlorinated dibenzodioxins, polychlorinated dibenzofurans, polycyclic aromatic hydrocarbons, and some other inorganics. Ninety-five (95) percent upper confidence limits on the mean of the soil, surface water, and sediment data were used together with pathway-specific intake equations and chemical specific toxicities to calculate the risks or HQs attributable to each COPC. Risks and HQs associated with ingestion of homegrown produce, lamb, fish, and breast milk were estimated based on soil, surface water, and sediment exposure point concentrations following recommended approaches from EPA (1989, 2005, 2011, and 2017).

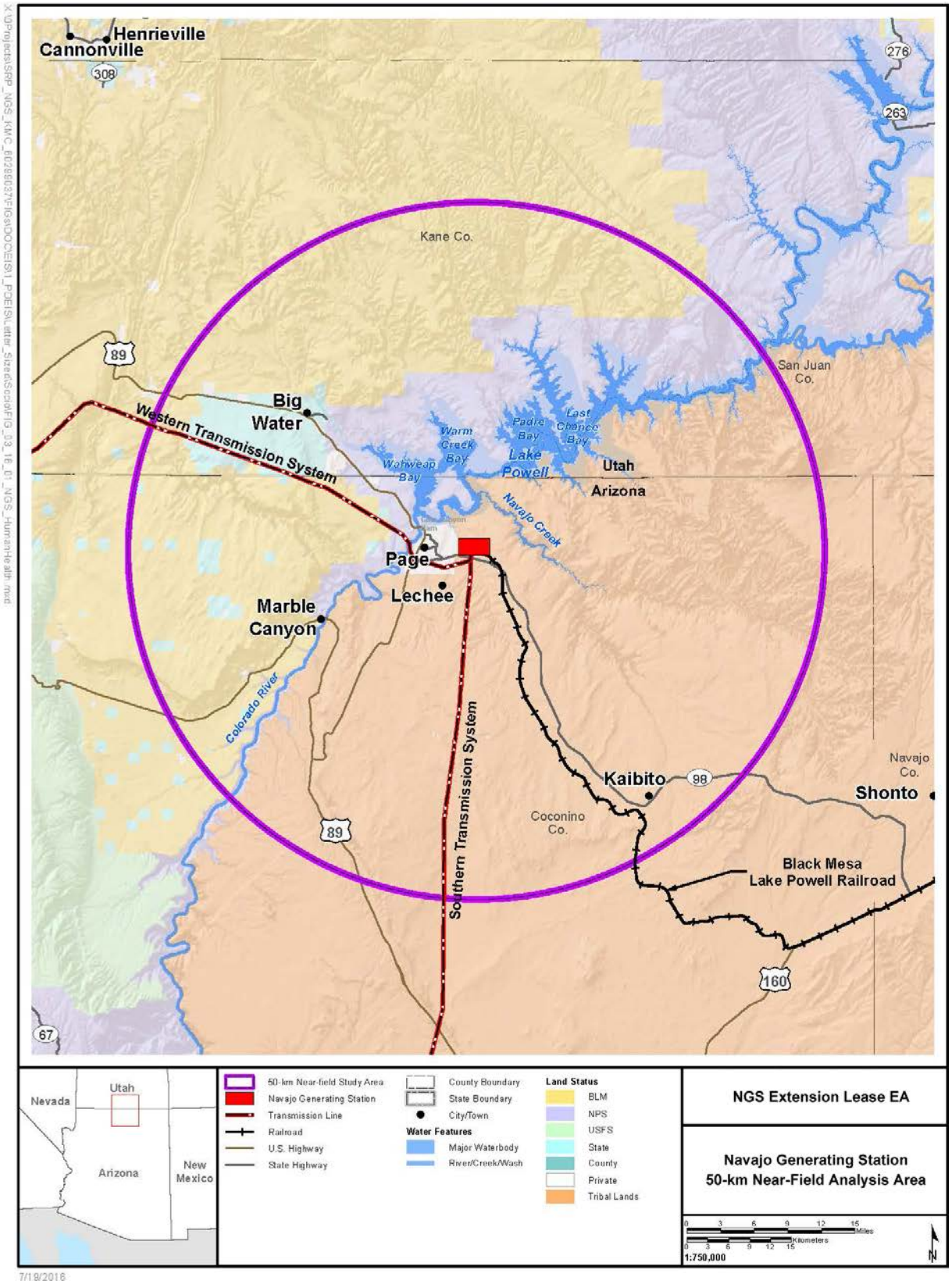

Figure 16. Navajo Generating Station 50-km Near-Field Analysis Area.

3.13.4.1.2 Risk Characterization

As presented in Table 41, the results of the NGS Baseline HHRA show that potential cancer risks due to existing on-the-ground conditions for off-site residents, resident gardeners, resident farmers, recreational users, and commercial workers are within the EPA acceptable risk range of 1×10^{-4} (1 in 10,000) to 1×10^{-6} (1 in 1,000,000). For noncancer effects, the NGS Baseline HHRA reported that the HIs for all receptors were equal to or less than the EPA benchmark of 1. The estimated HI for a recreational user child is the highest of all receptors at 1.2, due to exposure to methylmercury via fish consumption in Lake Powell. Note that the Arizona Game and Fish Department (AGFD) issued a fish consumption advisory in 2012 recommending that people, including pregnant women and children, limit their consumption of striped bass caught in the southern portion of Lake Powell (AGFD 2012b). The estimated average daily doses for infants exposed to dioxins/furans through ingestion of breast milk were well below the national exposure level of 60 picograms Toxic Equivalency Quotient/kilogram/day.

Table 41. NGS Baseline HHRA Results.

Receptor	Cancer Risk	Hazard Index	Breast Milk Average Daily Dose (pg/kg-bw/day)
Resident	1E-06	0.1	0.27
Resident-Gardener	3E-06	0.7	0.45
Resident-Farm Family	2E-05	0.8	1.9
Recreational User	1E-06	1.2[1]	NA
Commercial Worker	1E-07	0.02	NA
Benchmark[2]	1E-04 to 1E-06	1	60

[1] The HI of 1.2 for the child recreational user is due to exposure to methylmercury via the consumption of fish.
[2] Cancer risk estimates within or less than the benchmark cancer risk range are considered acceptable and require no further evaluation. HIs less than the target HI of 1 are considered acceptable and require no further evaluation. For dioxins and furans in breast milk, an average daily dose less than 60 pg/kg-bw/day is considered acceptable and requires no further evaluation.
pg/kg-bw/day = picograms per kilogram-body weight per day.

The estimated blood lead concentrations were well below both the EPA target blood lead level of 10 micrograms per deciliter (µg/dL) and the CDC reference blood lead concentration of 5 µg/dL.

The NGS Baseline HHRA concluded that negligible impact on human health was identified based on the baseline conditions in the vicinity of the NGS.

3.13.4.2 KM Baseline HHRA

The KM is an active coal mine located in northeast Arizona that has been in continuous operation for over 40 years. The KM Permit Area is approximately 62,930 acres and is located about 110 miles northeast of Flagstaff, Arizona, and 15 miles southwest of Kayenta, Arizona. The receptor population for the KM HHRA was defined as nearby residents located at various areas in and around the Permit Area. No other sensitive receptor subpopulations were identified in or around the Permit Area. The following receptors were considered in the HHRA at the KM: off-site residents, resident gardeners, and resident farmers. Baseline conditions represent the existing on-the-ground environmental conditions at the end of 2017. Baseline conditions include naturally occurring soil constituents, as well as any anthropogenic (human-caused) contributions from local, regional, and global emission sources, including past mining operations.

3.13.4.2.1 COPCs

COPCs in KM fugitive dust include metals (overburden/coal) and polycyclic aromatic hydrocarbons (coal). Criteria pollutants (particulate matter, carbon monoxide, ozone, sulfur dioxide, nitrogen dioxide, and lead) are generated in the course of some mining operations. Lead also was identified as a COPC and was evaluated quantitatively in the HHRA.

Soil sampling data collected in summer 2014 (Ramboll Environ 2016g) as part of the KM HHRA Field Sampling Plan Addendum (Flatirons Toxicology Inc. 2014) were used to evaluate baseline exposure conditions in 2017. For residential areas, 19 composite samples from the surface soil (0 to 3 inches) were collected within and outside the KM (Figure 17). An additional 8 surface soil samples collected from 7 reclaimed land parcels used for livestock grazing also were collected to evaluate potential exposure from this pathway. A total of 10 coal samples and 8 overburden samples were collected in accordance with the KM Field Sampling Investigation Report (Ramboll Environ 2016g).

3.13.4.2.2 Risk Characterization

As presented in Table 42, the results of the KM Baseline HHRA show that potential cancer risks due to existing on-the-ground conditions for the resident, resident gardener, and resident farmer are within the EPA acceptable risk range of 1×10^{-4} (1 in 10,000) to 1×10^{-6} (1 in 1,000,000). The HI for the resident-gardener and resident-farmer exceeded 1. When a HI exceeds 1, a target organ analysis is performed. As discussed in the footnotes of Table 42, the HHRA reported that all receptor HIs or target organ-specific HIs were less than the EPA benchmark of 1.

Table 42. KM Baseline Risk Case Result.

Receptor	Cancer Risk	Hazard Index
Resident	4E-06	0.9
Resident-Gardener	5E-06	1.1[1]
Resident-Farmer	7E-06	1.9[2]
Benchmark[3]	1E-04 to 1E-06	1

[1] A HI of 1.1 for the resident gardener child exceeded the target HI of 1 and required further evaluation consisting of a target organ analysis. The conclusions of the target organ analysis performed for the resident farmer child also apply to the resident gardener child (Flatirons Toxicology Inc. 2016).
[2] A HI of 1.9 exceeded the target HI of 1 and required further evaluation consisting of a target organ evaluation. Because the target organ evaluation for the resident farmer child exposure scenario demonstrated all target organ HI were acceptable, a similar evaluation was not performed for any other scenario or receptors (Flatirons Toxicology Inc. 2016).
[3] Cancer risk estimates within or less than the benchmark cancer risk range are considered acceptable and require no further evaluation. HIs less than the target HI of 1 are considered acceptable and require no further evaluation.

Lead was evaluated separately for noncancer health risk using EPA's IEUBK Model (EPA 2010). The model predicted that blood lead levels for children aged 0 to 7 years ranged from 0.2 to 0.4 µg/dL, well below both the EPA target blood lead level of 10 µg/dL and the CDC recommendation for reference blood level of 5.0 µg/dL (CDC 2012).

The KM Baseline HHRA (Flatirons Toxicology Inc. 2016) concluded that there were no unacceptable human health risks identified for the baseline risk case, and the impact on human health was negligible in the vicinity of the KM.

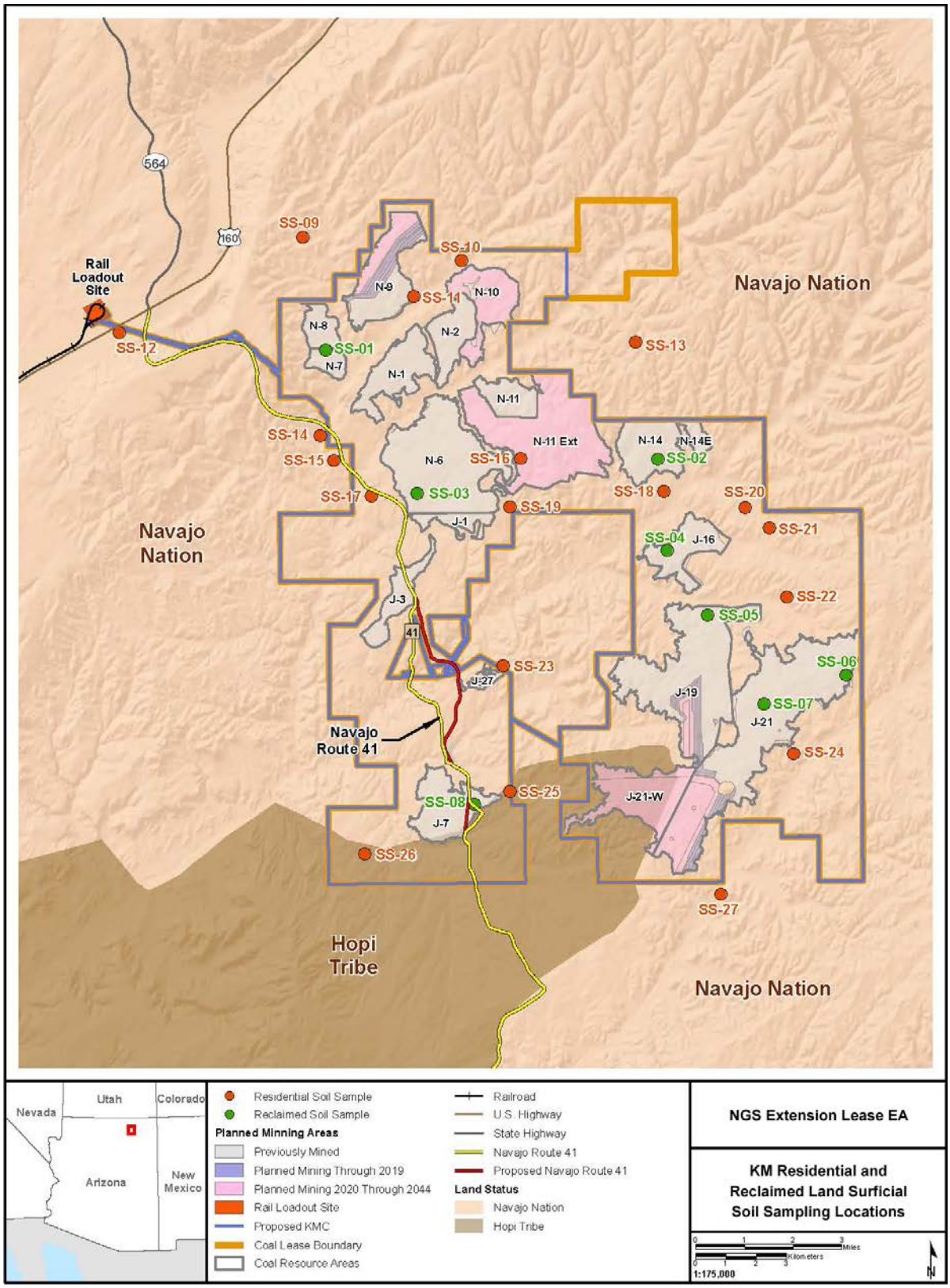

Figure 17. KM Residential and Reclaimed Land Surficial Soil Sampling Locations.

3.13.4.3 STS and WTS on Navajo Tribal Trust Lands

The existing transmission lines and communication sites operate at remote locations from the NGS and the KM. The communication sites include propane-fired backup generators that provide backup emergency power. Many of the sites are operated and maintained by other users. Given the relatively infrequent testing that is applied to these facilities, the remote locations, and the relatively low emission rates associated with propane-fired units, the air quality emissions and historical operation's impacts on existing air quality conditions and soil deposition are assumed to be minimal. Maintenance activities for the communication sites, transmission lines, and access roads can include vehicle traffic (vehicle exhaust and fugitive dust from unpaved roads), but the maintenance activities are often infrequent, short in duration, or localized. Therefore, emissions of historical operations are considered minimal, and the environmental impacts are considered negligible. An HHRA was not performed for receptors located at these sites because the exposure and potential risk would be less than the exposure and potential risk for residential receptors located in the vicinity of the NGS and the KM.

3.13.4.4 Public Health

This section provides a summary of the current health conditions of the potentially affected community, the affected environment with a focus on particulates, and baseline community health issues relevant to particulate inhalation.

3.13.4.4.1 Community Health—Particulate Inhalation

This section summarizes the health status of the local community with a focus on health issues relevant to particulate inhalation.

Of the 15 counties in Arizona, Navajo County, where the KM is located, ranks among the unhealthiest in the state. Life expectancy rates are lower, mortality rates are higher, and many behavioral risk factor rates exceed the state averages. The socioeconomic patterns in Navajo County could be responsible for a large part of the discrepancy between the health patterns of Navajo County relative to the rest of Arizona. Navajo County has higher poverty rates, higher unemployment rates, and lower education averages. Behavioral risk factors that contribute to poor community health, such as smoking, obesity, poor diet, and lack of adequate physical activity, lead to increases in the prevalence of chronic diseases, such as cardiovascular diseases, stroke, and diabetes, which are among the leading causes of mortality in Navajo County.

In contrast to Navajo County, Coconino County, where the NGS is located, ranks among the healthiest in the state. Many of the behavioral risk factors for Coconino County are ranked as healthier than the Arizona average (University of Wisconsin Population Health Institute 2015). This may be in part due to the relatively affluent communities of Flagstaff and Sedona, which are located within Coconino County but have much more diverse economies and more available social services and resources than the northern area of the county where the NGS is located (see Section 3.15, Socioeconomics and Environmental Justice).

The leading causes of death in Navajo and Coconino Counties are mostly related to chronic diseases that potentially could be mitigated by healthier lifestyles. Increased physical activity, improved diet, and the cessation of smoking could improve the county rates of obesity and high blood pressure, conditions which lead to some of the chronic diseases. Some chronic diseases such as cardiovascular disease, chronic lower respiratory disease, and stroke are all potentially associated with particulate inhalation, particularly particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$).

3.13.4.4.2 Environment—Air Quality

Section 3.3, Air Quality, provides an assessment of the current air quality conditions in the analysis area. The monitoring data demonstrate that the regional air quality conditions are much better than the NAAQS for all criteria pollutants. The overall air quality conditions and air quality–related values in the region are generally improving or being maintained. Coconino County is ranked among the cleanest air quality counties in the country, which suggests that NGS emissions do not have detrimental effects on $PM_{2.5}$ air quality (American Lung Association [ALA] 2015). Overall, the analysis of recent air quality data for criteria air pollutants indicate that NGS and KM emissions do not result in exceedance of the health-protective NAAQS levels at air quality monitors in or near the Nation. Concentrations of criteria air pollutants are generally below NAAQS levels at the air quality monitors closest to the NGS and KM facilities.

Power plants could be sources of both primary particles and secondary particles (Stanek et al. 2011; EPA 2009b). EPA's Integrated Science Assessment for Particulate Matter concluded that short-term and long-term exposure to $PM_{2.5}$ could cause cardiovascular effects, respiratory effects, and cardiovascular- and respiratory-related mortality. In addition, PM exposures have been linked with worsening adverse effects in asthmatics and worsening existing cardiopulmonary problems for those with diabetes (EPA 2009b).

It is important to note that there are multiple causes of diseases associated with particulate exposures. Although it is possible that some cases of cardiovascular problems, respiratory problems, lung cancer, and diabetes may be related to, result from, or be worsened by $PM_{2.5}$, most cases of these health problems are associated with other causes, including lifestyle factors such as diet, inactivity, and alcohol consumption, which occur at higher rates in Navajo and Coconino Counties and in comparative locations. In addition, indoor air quality has been shown to be a factor associated with respiratory illness among the Navajo, as an issue related to burning coal in homes as a source of particulate matter in indoor air (Bunnell et al. 2010), especially in homes with stoves that have been found to not function properly or not be properly vented (Charley 2013; EPA 2014a). A pamphlet developed by PWCC describing safety tips for proper in-home use is available for residents who obtain coal from PWCC.

3.13.4.5 Public Safety and Noise

The affected environment for public safety and noise includes human resources that could be affected by noise and vibrations. The historical noise and vibration near the NGS and the KM has been dominated by noise associated with mining and power plant operations, including coal processing, blasting, and rail hauling and unloading. Low-frequency vibrations include those from heavy equipment or trucks traveling through the analysis area and blasting.

3.13.4.5.1 NGS and Associated Facilities

There are six noise-sensitive receptors (i.e., residences) within the NGS analysis area; four are located approximately 1 to 2 miles southeast of the NGS facility near Arizona Highway 98, one is located 0.5 mile south of the lake pump facility at Lake Powell, and one is located 0.75 mile west of the lake pump facility at Lake Powell. The NGS Emergency Response Plan (Response Plan) provides guidelines to augment the health and safety of NGS employees and the public in the event of an emergency, such as fire, explosion, hazardous materials release, terrorism, workplace violence, or other catastrophic events. Formalized mutual aid agreements would further lessen the risk of impacts on the workers and the surrounding communities in the case of an emergency. Unwritten mutual aid agreements are in place with the City of Page, PWCC, NPS, Coconino County Sheriff's Department, and Nation law enforcement.

An NGS emergency action plan (action plan) has been developed in accordance with OSHA. The action plan facilitates and organizes employee actions during workplace emergencies (SRP 2017d). Additional resources for an incident such as firefighting include one million gallons of water in the NGS Makeup Reservoir reserved for fighting fires.

Current noise and vibration at the NGS and associated facilities result from an assortment of sounds at varying frequencies from typical plant operations, as well as noise associated with coal rail operations and maintenance actions on associated facilities. Noise levels at the NGS are assumed to be similar to those experienced near the KM (detailed below), with the exception of KM blasting noise levels, as there are no blasting activities during operations at the NGS.

Ongoing operation, repair, preventative maintenance, and improvements of the BM&LP Railroad track structure, catenary system, crossing locations, crossing gates, signals, signage, ROW roads, water drainage systems, culverts, fire walls, and cattle guards are performed to ensure the safety of train operations and the public, and to prevent livestock from accessing the ROW. Safety is further enhanced by training railroad operations teams to use standardized visual and auditory signals for public safety communication. The locomotive horn, bells, and flashing ditch lights are used at crossings. Headlights are used to increase train visibility when a train is in motion, and flares are used at night to warn motorists when a crossing is blocked by a stationary train.

Noise connected with the BM&LP Railroad is related to coal loading from the silos at the rail loading site and unloading activity at the NGS, the locomotive horn, and bells that are used at crossings. The nearest sensitive receptors to the BM&LP Railroad coal-loading silos are a cluster of homes located 800 feet from the railroad on the south side of U.S. Highway 160.

3.13.4.5.2 KM

Safety practices at the KM comply with the policies and procedures established by MSHA and are consistent with all federal, state, and tribal regulations related to mining operations. The main hazards associated with mining and explosives use are the handling of explosives and the proximity of workers to the blast site. Blasting is used during mining operations to fragment material for excavation and transport. Blasting operations at the KM are conducted according to federal law, applicable regulations, and the approved permit application. Blasts are monitored for air blast (noise) and ground vibration twice per year in June and December. PWCC monitors air blast and ground vibration for all shots exceeding the scaled distance equation, as well as any required by the regulatory authority at their requested location(s). MSHA regulates the storage of explosives used for blasting activities (30 CFR Parts 56 and 57). Blasts are monitored for air blast and ground vibration by five seismographs located throughout the Permit Area.

The existing noise environment in the analysis area is dominated by noise associated with mining operations, including coal processing, blasting, and hauling. Noise levels in the analysis area were estimated from typical mining equipment noise levels (Table 43). Existing sound levels at 50 feet from equipment are likely to range from 50 dBA to 95 dBA for typical daytime noise levels, depending on the level of intensity of mining activities, and decreasing with distance from the noise source. Monitoring levels for ground movement and air overpressure from the mining operation have not exceeded established OSMRE limits since 2010.

Under OSMRE's permitting requirements, a resident or owner of a dwelling or structure within 0.5 mile of any part of the KM Permit Area may request that a pre-blasting survey be conducted on their dwelling or structure. Upon receipt of this request, PWCC conducts the survey by analyzing the conditions of the dwelling or structure prior to blasting activities and documenting any pre-blasting damage and other physical factors that could be affected by the blasting.

Exposure to flyrock, or rock that is ejected into the air or along the ground from a blast, is controlled by the blasting design and by limiting access near the blast. Residents in or nearby the blasting area are evacuated prior to proceeding with any blasting actions. Residents are notified in advance of the blasting schedule, and notices are posted in public locations. The KM permit requirements are more stringent than the typical federal requirements, which allow mining to within 300 feet of a dwelling or structure.

Along Navajo Route 41, PWCC assists with maintenance of the road surface and slopes and coordinates maintenance with the Nation DOT for repaving or seal coating the road or through their own roadway maintenance contract to maintain roadway shoulders and drainage. To ensure public safety along the mine roads, public traffic is excluded from active mine areas by security gates. All roads are signed and maintained by grading and dust suppression, and school buses and deliveries are escorted by PWCC security vehicles.

Table 43. Source Noise and Noise Exposure Estimates.

Noise Source		Source-to-Receiver Distance (feet)	Noise Exposure Estimates[1] (dBA)	Source-to-Receiver Distance (feet)	Noise Exposure Estimates[1] (dBA)
Mining and Excavation	Bucket loader	50	89	200	65
	Haul trucks (100 tons)	50	88	200	64
	Ore trucks (tractor-trailer)	50	88	200	64
	Water truck	50	91	200	67
	Front-end loader	50	80	300	70
	Fork lift	50	73	200	49
	Dozer	50	92	300	77
	Rock drill	50	95	300	79
	Dragline crane	50	88	300	73
	Scraper	50	92	300	77
	Pumps	50	71	200	47
	Generators	50	83	200	59
	Compressors	50	86	200	62
Traffic	Roadways[2]	50	70	200	60
	Electric railroad[3]	50	70	240	60

[1] All noise exposure estimates are based on typical highway or vehicle operation. Railroad noise levels are described in day-night average sound level; all others are in equivalent noise level daytime.
[2] Roads with traffic at 55 miles per hour, but without trucks.
[3] Typical for BM&LP (electric) Railroad operations.
Source: Minor, Michael & Associates (2000); FTA (2006).

3.13.4.5.3 STS and WTS on Navajo Tribal Trust Lands

There are three 500-kV transmission lines associated with the STS and WTS plus two communication sites associated with the STS and co-located with other facilities. A third communication site is associated with NGS operations. There are no sensitive receptors under or within 200 feet of either side of the 500-kV transmission lines.

Public health and safety concerns associated with transmission lines typically are focused on the effects of electromagnetic fields. There are no federal standards for transmission line electric fields; the voluntary exposure limits for magnetic fields is 2,000 milliGauss for the public (International Commission on Non-Ionizing Radiation Protection 2010). The average electric and magnetic field readings for a 500-kV line at the edge of the analysis area (200 feet from ROW centerline) are 0.6 kV per meter and 20 milliGauss, respectively. Noise levels from a line source such as a power line will decrease by 3 dBA for every doubling of the distance away from the source (Truax 1999). Noise levels for a 500-kV line at the edge of the analysis area are 48 dBA (BLM 2011).

3.13.4.6 Hazardous Materials

Section 3.7, Solid and Hazardous Waste, discusses the affected environment for hazardous and solid waste, and the resources within the analysis area that could be affected by an accidental release of products, chemicals, or hazardous or solid wastes.

The volumes of hazardous materials used, and the generation of solid waste during maintenance of the transmission lines, substations, switchyards, and communication sites, are considerably less than used or generated at the NGS and the KM. In addition, the use and disposal of these materials are episodic and depend on the required maintenance or repairs.

3.13.4.6.1 NGS and Associated Facilities

Storage tanks are used to store a variety of liquid hazardous materials (e.g., used oil) and chemicals (e.g., sulfuric acid) used in plant operations. A list of storage tanks used to store hazardous materials is included in the NGS O&M Plan (SRP 2017d). The hazardous material used in the largest quantity is diesel fuel. Chemicals are transported to the NGS on highways and facility access roads. A summary of vehicle fuel usage, other chemical usage, and transportation is provided in the NGS O&M Plan (SRP 2017d).

3.13.4.6.2 KM

The primary products and chemicals transported to, stored, and used at the KM are diesel, gasoline, lubricating oil, gear oil, hydraulic oil, vehicle antifreeze, and ammonium nitrate (Lehn 2015). All chemicals and products used are transported on major highways and KM facility access roads. Under the regulatory framework described above, diesel fuel is the largest by volume of the products used at the KM.

3.13.4.6.3 STS and WTS on Navajo Tribal Trust Lands

Hazardous materials used in the operation and maintenance of the transmission line corridors and communication sites consist primarily of vehicle fuel, propane for emergency backup generators, and di-electric oil used in the electrical equipment at the substations.

3.13.5 Environmental Consequences

The potential health- and safety-related environmental consequences of the No Action and Proposed Action alternatives are disclosed in this section. The cumulative effects of the Proposed Action are presented at the end of this section.

3.13.5.1 Assumptions and Methodology

3.13.5.1.1 HHRA

The analysis methods for the HHRA consist of the following:

- Identify the key COPCs
- Analyze the impact on exposure media by deriving exposure point concentrations for each medium
- Evaluate the potential adverse health effects from COPCs
- Assess the potential impacts for the No Action alternative and the Proposed Action
- Determine the impact on human health receptors based on the magnitude of cancer risk estimates and noncancer HIs; acceptable risk estimates are associated with negligible impact on human receptors

3.13.5.1.2 Public Health

In assessing the potential for health impacts due to the No Action and Proposed Action alternatives, the health categories selected and described in the affected environment discussion in Section 3.13.4 and Table 40 are evaluated in this section. The magnitude of the health impact is assessed by evaluating several factors: the level of consequence, the duration of the exposure, and the number of people potentially affected. In addition, effects are categorized as positive or negative.

3.13.5.1.3 Public Safety and Noise

The methodology for evaluating impacts on public safety involves identifying and assessing operational standards and guidelines for the project components during the continued operation of the NGS, the KM, and the STS and WTS and their subsequent retirement or closure, and determining potential effects on sensitive receptors within the analysis areas. Noise and vibration impacts are evaluated based on the extent the activity could exceed federal noise and vibration regulations at sensitive receptors.

3.13.5.1.4 Hazardous Materials

The impact analysis involved the review of a variety of sources including information from SRP and PWCC, government agencies, and published documents. The review of data sources documented potential impacts of hazardous materials. The potential impacts associated with CCR disposal are discussed in Section 3.7, and the potential impacts from spills and releases on soil and water resources are discussed in Section 3.6 and Section 3.8, respectively. Accident and incident data were obtained from publicly available data provided by federal and state governmental agencies.

3.13.5.2 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.

3.13.5.2.1 NGS and Associated Facilities

The retirement activities of the NGS and the railroad catenary, which are described in detail in Section 2.4.1.1 (Retirement Actions) include but are not limited to demolition of existing structures, buildings, and utilities (except those that the Nation requests to retain); removal or closure of ponds and landfills; surface restoration through revegetation and modification of the existing topography; and demolition and removal of the overheard catenary system, electrical distribution lines, supporting superstructure, concrete foundations, and transformers of the railroad. The railroad track and related facilities are assumed to be retained for potential future use by the Nation.

HHRA

Under the No Action alternative, retirement activities would require use of a variety of heavy equipment including cranes, loaders, dozers, scrapers, and excavators. Blasting would be used in the demolition of some structures. The primary air emissions from these operations would be fugitive dust emissions and vehicle and equipment exhaust emissions. As discussed in Section 3.3, Air Quality, heavy vehicle and equipment use would result in engine exhaust emissions of CO, NO_x, and SO_2, as well as DPM. The magnitude of emissions would depend on the number of heavy equipment vehicles required for each operation and the total hours of use. The use of explosives in demolition blasting would result in NO_x emissions in addition to fugitive dust. CO, NO_2, and NO_x have adverse noncancer acute impacts on public health; SO_2 and DPM can cause both acute and chronic impacts on public health. The health effects associated with these pollutants are as discussed above in Section 3.13.4.4.

The air quality and health risk impacts during retirement activities would be localized and limited to the period in which retirement activities occur. Furthermore, BMPs for dust control would be adopted to minimize emissions, protect air quality, and reduce health risk impacts.

Public Health

The potential public health impacts focused primarily on environmental air quality; the health impacts of socioeconomics, public services and infrastructure, and demographics are also considered. This section evaluates the positive and negative effects of these potential health issues on the local community and the cumulative impacts.

Environmental Air Quality and Public Health

The following discussion focuses on the potential impacts on public health associated with $PM_{2.5}$ emissions that would result from the alternatives. Maximum impacts on ambient concentrations of $PM_{2.5}$ would be experienced by receptors that are very near the facility boundaries, and the impacts would rapidly decline with distance from the facilities.

Under the No Action alternative, the $PM_{2.5}$ emissions would be reduced after the NGS ceases operations. The air quality and health impacts during retirement activities would be localized and limited to the period in which retirement activities occur. This would result in a long-term beneficial effect on ambient air quality and to public health.

Sensitive Subpopulations

Socioeconomic status is a strong determinant of individual health (WHO 2008). The population within the analysis area is considered both a low-income and minority race environmental justice population (see Section 3.15, Socioeconomics and Environmental Justice). As discussed in Section 3.12, Land Use and Recreation, the overall area surrounding the NGS is sparsely populated with the exception of the city of Page and the developable area of LeChee Chapter.

Some residents may be in poorer health due to their socioeconomic conditions and limited access to health care. A broad range of health effects may be associated with ambient PM, as described in Section 3.13.4. Baseline impacts associated with NGS operations at these receptor points are negligible with respect to background. Even if sensitive individuals are present in the city of Page or LeChee Chapter, they are unlikely to be affected by the No Action alternative.

Fugitive dust and PM from retirement activities at the NGS site would be localized, limited in duration, and not likely to affect sensitive receptors near the NGS site boundary. In addition, there are very few sensitive receptors in the area that would be affected. Therefore, the effect from the retirement activities for either alternative would be negligible and short-term. Retirement of the NGS would eventually eliminate PM and COPC emissions from the facility. This would result in a long-term beneficial effect.

Economy and Community Health

Under the No Action alternative, the long-term ambient air quality would improve; however, the economic effects from NGS retirement would result in reductions of revenues and income within the analysis area. In communities that have relatively poor baseline health characteristics and high poverty rates, the loss of personal and family income and the reduction in social services that may result from the alternatives would have a long-term adverse impact on community health (see Section 3.15, Socioeconomics and Environmental Justice). Within the Nation as a whole, loss of revenues to fund social services and government programs would have a long-term, adverse effect on community health.

Public Safety and Noise

Noise from retirement activities would include blasting, deconstruction of the buildings, earthwork and civil engineering to remove ponds and other infrastructure, closing and capping of ponds and landfills, grading of the site, removal of the railroad catenary, and truck traffic for salvage material disposal. The nearest noise-sensitive receptors to the NGS are four scattered residences approximately 1 to 2 miles to

the southeast near Arizona Highway 98, and a residence located 0.5 mile south of and the Antelope Canyon Tribal Park entrance located 0.75 mile west of the lake pump facility at Lake Powell. At these distances, no noise impacts are anticipated that would affect sensitive receptors.

Hazardous Materials

As part of the retirement and decommissioning process, the following activities would take place with regard to hazardous materials, following all applicable regulations and BMPs (SRP 2017d):

- A comprehensive environmental site assessment (ESA) would be conducted to determine if there are any sources or paths of contamination and to identify environmental receptors and develop remedial alternatives if applicable.
- On-site sampling would be conducted as necessary to determine if environmental issues exist.
- There would be a short-term increase in truck traffic during demolition. Handling and transport of all regulated materials would follow federal or other applicable regulations for public health and safety including USDOT and ADOT regulations.
- Transportation of asbestos would follow all federal regulations for asbestos handling and transport (see Appendix 2).

The impacts due to closure and decommissioning would be negligible because removal and cleanup of potential contaminants; cap and closure of the CCR, ponds, and solid waste landfills; removal of the asbestos landfill; and remediation of the site to industrial standards would contribute to overall restoration of the site and reduce the risk of exposure to sensitive receptors in the future.

3.13.5.2.2 KM

Because the NGS is the only market for coal from the KM, the closure of the KM would coincide with the closure and retirement of the NGS and would be performed according to the provisions of the approved mine PAP and SMCRA regulations. Upon shutdown of the mine on or before December 22, 2019, reclamation operations would continue to contribute to cumulative criteria pollutants near the mine until PWCC's reclamation obligations are met. Facilities would be dismantled or demolished, and materials would either be salvaged or buried. Concrete foundations and sub-bases would be removed or buried, and the surfaces would be reclaimed through grading, spoil sampling, subsoil and topsoil replacement, and revegetation through seeding.

HHRA

The KM directly supports the NGS and includes operations that have historically resulted and currently result in air emissions. Emissions of criteria pollutants are generated by mining operations (coal and overburden removal and transport), coal preparation plant activities (coal transfers, crushing, screening, stockpiling), and wind erosion of stockpiles and disturbed areas. The majority of these emissions consist of fugitive and process particulate matter (total suspended particulates, PM_{10}, and $PM_{2.5}$). Section 3.3, Air Quality, details the potential impacts on air quality associated with the proposed operations of the KM.

Decommissioning and reclamation activities would result in some emissions from heavy machinery, but these activities would be short-term and confined within the boundaries. The No Action alternative would result in the elimination of COPC and PM emission from the KM, thus eliminating any cancer and noncancer risk to sensitive receptors in the analysis area after the KM ceases operations.

Public Health

Environmental Air Quality and Public Health

Air emission sources and health risk impacts would be similar to those described above for the NGS retirement and would be localized and only occur during closure and reclamation activities.

Sensitive Subpopulations

The No Action alternative would result in the elimination of emissions from mining activities, which would have a long-term beneficial effect on sensitive subpopulations in the area. Decommissioning and reclamation activities would produce fugitive dust and emissions from machinery. These activities would be short-term. The Navajo and Hopi residing within or near the KM permit boundary represent the population of greatest concern for exposure to $PM_{2.5}$. Because Navajo County, where the KM is located, ranks among the unhealthiest in the state in addition to being a sensitive subpopulation due to socioeconomic conditions (WHO 2008), there could be a higher proportion of people with asthma in the analysis area compared with the general Arizona or U.S. population. The negative health effects for sensitive subpopulations due to potential $PM_{2.5}$ emissions associated with retirement activities are short-term and negligible.

The public health issues within the analysis area are compounded by the use of wood or coal as an indoor fuel with inadequate domestic facilities (i.e., stoves that do not function properly or are not properly vented).

Economy and Community Health

The general health of the local community ranks poorly compared to the rest of Arizona (Gradient 2016; Arizona Department of Health Services [ADHS] 2015a, 2015b). Lifestyle risk factors are a major driver of the overall well-being of the local community. While this public health evaluation does identify some level of short-term adverse health impacts associated with the No Action alternative, particularly associated with noise and vibration nuisances that could impact the psychosocial state and overall well-being of the community, these potential impacts are likely negligible relative to the lifestyle risk factors that are contributing to the general health of the community, and they would be reduced or eliminated as the KM closes in response to NGS retirement.

After the KM closes, relocations of residents within the KM boundary would cease, and there may be potential for relocated residents to return to their former lands after reclamation. Navajo have deep ties to their ancestral land, and this may result in greater well-being as traditional land is returned to families (see Sections 3.12, Land Use; and Section 3.15, Socioeconomics and Environmental Justice).

Many residents graze livestock on reclaimed and undisturbed lands within the KM for a food source and for economic and cultural reasons. The HHRA determined that no unacceptable health risk exists for residents consuming livestock that graze in the permit boundary or consuming plants harvested from within or near the mine site after reclamation. The restoration of grazing land would result in minor long-term beneficial effects to community health as residents are allowed to return to traditional lands and grazing land quality is improved (see Section 3.12, Land Use and Recreation).

Public Safety and Noise

During the closure activities of the KM, PWCC would continue to comply with all applicable federal, tribal, and state rules and regulations regarding health and safety and the handling and disposal of explosives and hazardous materials and wastes. Safety procedures regarding truck traffic would continue to be observed during reclamation activities, although fewer vehicles would be required for these activities. After the reclamation period, PWCC would no longer assist with Navajo Route 41 roadway maintenance or provide dust control measures. Emergency health care and first responder services provided by the mine would continue during the reclamation period but would cease following the completion of reclamation activities.

Noise and vibration effects associated with decommissioning would be limited to activities associated with removal of surface structures, facilities, and mining equipment, as well as reclamation activities. Mine-related noise and vibration effects would cease following the completion of decommissioning and

reclamation. The likelihood of effects is high, and the magnitude of the consequences would be negligible. These activities would result in negligible short-term effects because procedures and precautions to reduce exposure and risk would continue to be followed during closure and reclamation activities.

Hazardous Materials

The most used product at the KM is diesel fuel, and the risk of a transportation incident would be eliminated as the KM ceases operations and completes reclamation activities under either alternative. The mine is required to have an SPCC Plan and an Emergency Response Plan to cover the storage, handling, and spill prevention and management of petroleum and hazardous materials. If an accident resulting in a release should occur during reclamation activities or before the mine operations cease, the effects would be anticipated to be negligible to minor depending on the location of the release.

3.13.5.2.3 STS and WTS on Navajo Tribal Trust Lands

It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically. In the event that agreement cannot be reached between the Nation and the NGS Lessees regarding the portions of the STS and WTS located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019. Retirement involves decommissioning and dismantling of the transmission system and facilities, and reclamation and restoration of the land. For purposes of discussion of the No Action alternative, it is assumed that the STS and WTS will be retired on Navajo Nation Tribal Trust lands and land restoration will occur by the end of 2019. If the STS and WTS continue to be operated, the impacts would be the same as described under the Proposed Action in Section 3.13.5.3.3.

HHRA

The communication sites include propane-fired backup generators that provide backup power. These sites are operated and maintained by other users, so use of generators would continue under the No Action alternative. Given the relatively infrequent testing that is applied to these facilities, the remote locations, and the relatively low emission rates associated with propane-fired units, the emissions and impacts on existing air quality conditions are likely minimal, and the impact on human health would be negligible.

Public Health

Retirement of the STS and WTS, described in Section 2.3.3.3, would likely result in localized emissions along the transmission lines and access roads from vehicle traffic and equipment use (vehicle exhaust and fugitive dust from unpaved roads and temporary construction disturbance). However, these activities would be infrequent, of short duration, and localized. Therefore, emissions from retirement would be minimal, and the public health impacts would be negligible (see Section 3.3.4.1.3).

Public Safety and Noise

If an agreement for continued operation of the STS and WTS is not executed, the STS and WTS would be retired. As noted in Section 3.13.4.5.3, there are no residences near the existing ROW, construction activities would be temporary and short-term along the transmission line, and construction areas would restrict public access; thus, no noise impacts or concerns of public safety are anticipated during retirement activities.

Hazardous Materials

Under the No Action alternative, the major products used would consist of petroleum fuels and other materials related to vehicle maintenance. These activities would result in minimal effects from hazardous materials on public or human health, as they would not result in changes to the baseline conditions. Transport of hazardous materials and solid waste associated with the transmission systems would follow

federal or other applicable regulations for public health and safety including USDOT and ADOT regulations.

3.13.5.3 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period. The potential effects of 2 years of operations on human health, public health, public safety and noise, and the risks associated with transport of hazardous materials and solid waste are discussed in the following sections.

3.13.5.3.1 NGS and Associated Facilities

HHRA

A HHRA (Ramboll Environ 2016e) evaluating potential human health impacts due to exposures to COPCs emitted from the NGS between 2015 and the end of 2019 in the analysis area was used to evaluate human health impacts for the 2-year period of operations anticipated by the Proposed Action. This HHRA is described in this section.

The COPCs quantitatively evaluated in the HHRA for the Proposed Action include metals, polychlorinated dibenzodioxins, polychlorinated dibenzofurans, polycyclic aromatic hydrocarbons, volatile organic compounds, DPM, diphenylmethyl, and some other inorganics. Exposure point concentrations for COPCs in air were based on model-predicted air concentrations provided by the Near-Field air modeling (Ramboll Environ 2016c). Exposure point concentrations for COPCs in soil, surface water, sediment, homegrown produce, livestock, fish, and breast milk were estimated following methodology recommended in the HHRAP (EPA 2005) based on air concentrations and deposition rates predicted by the Near-Field air modeling. The model-predicted exposure point concentrations for soil, surface water, and sediment used in the Proposed Action HHRA generally are a few orders of magnitude lower than the field sampling data collected in the summer of 2014 for the baseline HHRA to evaluate the affected environment.

The estimated excess lifetime cancer risks were conservatively calculated based on a 5-year exposure duration for child and adult receptors separately, as discussed in the KM 5-Year Permit Renewal NGS HHRA Report (Ramboll Environ 2016e). As presented in Table 44, the results of the HHRA predicted that the excess lifetime cancer risks due to emissions from the Proposed Action at the NGS for each receptor evaluated in the HHRA were within the acceptable EPA cancer risk range of 1×10^{-4} to 1×10^{-6}. For noncancer effects, the HHRA reported all HIs less than the benchmark of 1. The estimated average daily doses for infants exposed to dioxins/furans through ingestion of breast milk were well below the national average background exposure level of 60 kilogram/day toxic equivalency quotient. The estimated blood lead concentrations were well below both the EPA target blood lead level of 10 µg/dL and the CDC reference blood lead level of 5 µg/dL (Ramboll Environ 2016e). Given the degree of conservatism purposefully built into the risk assessment methods and benchmarks, the HHRA results for the Proposed Action indicate that negligible impact on human health would occur in the vicinity of the NGS based on this future scenario because potential risks to human health were considered acceptable and required no further evaluation. Once NGS operations cease, the long-term HHRA effects would be identical to those under the No Action alternative.

Table 44. Comparison of NGS Baseline and Proposed Action HHRA Results.

Receptor	Cancer Risk		Hazard Index		Breast Milk Average Daily Dose (pg/kg-bw/day)	
	Baseline	Proposed Action	Baseline	Proposed Action	Baseline	Proposed Action
Resident	2E-06	3E-06	0.1	0.06	0.27	0.00024
Resident-Gardener	5E-06	3E-06	0.7	0.06	0.45	0.00046
Resident-Farm Family	4E-05	4E-05	0.8	0.2	1.9	0.0057
Recreational User	4E-06	3E-08	1.2[1]	0.01	NA	NA
Commercial Worker	5E-07	9E-06	0.02	0.05	NA	NA
Benchmark[2]	1E-04 to 1E-06		1		60	

[1] The HI of 1.2 for the child recreational user is due to exposure to methylmercury via the consumption of fish.
[2] Cancer risk estimates within or less than the benchmark cancer risk range are considered acceptable and require no further evaluation. HIs less than the target HI of 1 are considered acceptable and require no further evaluation. For dioxins and furans in breast milk, an average daily dose less than 60 pg/kg-bw/day is considered acceptable and requires no further evaluation.
pg/kg-bw/day = picograms per kilogram body weight per day.

Public Health

Environmental Air Quality and Public Health and Sensitive Subpopulations

The Proposed Action would result in a continuation of existing emissions and impacts for 2 years beyond the No Action alternative. Section 3.3, Air Quality, details the potential impacts on air quality associated with the Extension Lease. Though the maximum impacts associated with proposed NGS operations could increase the current 24-hour and annual $PM_{2.5}$ concentrations, the maximum cumulative impact on 24-hour and annual $PM_{2.5}$ concentrations would still meet the NAAQS criteria.

The available data and conservative modeling results indicate that negligible health effects are expected to be associated with the Extension Lease. A possible exception would be the potential health impacts on the sensitive subpopulations with existing conditions that could be exacerbated by slight increases in $PM_{2.5}$ emissions associated with the Proposed Action, for 2 years beyond the No Action alternative. The use of coal as an indoor fuel source is a common practice among the local communities in both the NGS and KM areas, which could explain some of the symptoms described by the local community. Once the NGS operations cease, the long-term effects would be identical to those under the No Action alternative.

Economy and Community Health

Potential positive health impacts associated with Proposed Action include 2 years of employment, income, and revenues from the NGS and the KM to local residents, the majority of whom are Navajo. Under the Extension Lease, the Nation and possibly the Hopi Tribe would receive coal royalty payments amounting up to $39 million (see Section 2.3). These revenues would support social services and government programs that promote community health. The long-term effects on public health from the Proposed Action would be essentially the same as those from the No Action alternative, except that the Proposed Action would continue NGS operations until 2019 and would guarantee the Nation and the Hopi Tribe some benefits such as coal royalty assurances and continued lease payments (see Section 2.3.1 and Section 3.15, Socioeconomics and Environmental Justice).

In general, the sustained employment associated with continued operations of the NGS and the KM and 2 years of payments to the Nation and the Hopi Tribe would contribute toward positive health impacts. The economic benefits associated with continued employment could lead to continued access to health services, better nutrition, and better overall well-being. The Extension Lease would also allow an additional 2 years for the tribes, individuals, and families to plan for loss of revenue, jobs and income, and social services that promote health and well-being (IEEFA 2017b). After the NGS is retired, the long-term effects would be the same as those under the No Action alternative.

Public Safety and Noise

Noise from the NGS operations would not change from baseline conditions. Sound levels would not approach levels that have been associated with hearing impairment. Current noise and vibration at the NGS and associated facilities consists of an assortment of sounds at varying frequencies from typical plant operations, as well as noise associated with coal rail operations and maintenance actions on associated facilities. No noise impacts from the 2 years of NGS operation would occur outside the plant boundaries as there are no sensitive receptors within 0.5 mile of the NGS or 200 feet of the BM&LP Railroad. The nearest sensitive receptors to the NGS are four scattered residences approximately 0.5 to 2 miles away. At these distances no noise impacts are anticipated at these sensitive receptors.

Activity on the BM&LP Railroad would stay the same as compared to historical BM&LP Railroad activity until 2019. The distance of sensitive receptors from the BM&LP railroad as well as the long-term historical presence of the BM&LP railroad would result in negligible impacts on sensitive receptors during this time period.

Ongoing operation, repair, preventative maintenance, and improvements of the railroad track structure, catenary system, all crossing locations, crossing gates, signals, signage, ROW roads, water drainage systems, culverts, and cattle guards is performed to ensure the safety of train operations, ensure the safety of the public, and prevent livestock from accessing the ROW (SRP 2017d).

After NGS retirement activities commence, the effects on public safety and noise would be the same as those under the No Action alternative.

Hazardous Materials

The 2 years of NGS operations may result in increased risk of an accident or event that would result in risk of exposure to sensitive receptors or the public; however, NGS must comply with the regulations and public safety procedures in Appendix 2; therefore, there would be a low likelihood of accidents or risk exposure occurring and a low magnitude of consequence. The effects on public health would be negligible and short-term. The short-term and long-term effects would be identical to those under the No Action alternative for the retirement activities and post-closure conditions once the land is surrendered back to the Nation.

3.13.5.3.2 KM

HHRA

Potential risks from airborne COPCs were evaluated quantitatively on a site-wide basis, while potential risks for the soil and food exposure pathways were evaluated qualitatively because soil concentrations attributable to the Proposed Action were negligible. The cancer risk estimates for the receptors for continued operation of the mine would be 1.0×10^{-6} and at the lower end of the EPA acceptable cancer risk range. The HI would be 0.02, well below the EPA target HI of 1. The probability of a child's blood lead exceeding the CDC reference level (5 µg/dL) for the KM is less than 0.0001 percent. Because the cancer and noncancer risk estimates were below the benchmark values, they required no further evaluation. Human health impacts from KM operations under the Proposed Action would be negligible (McVehil-Monnett Associates Inc. 2016). Once the KM mining operations cease in response to NGS retirement, the long-term effects would be identical to those under the No Action alternative.

Public Health

Environmental Air Quality and Public Health and Sensitive Subpopulations

The public health issues within the analysis area are compounded by the use of wood or coal as an indoor fuel with inadequate domestic facilities. These variables could potentially result in $PM_{2.5}$ exposures far greater than those associated with KM operations (Gradient 2016). Therefore, the magnitude and the

likelihood of the health impact of air quality resulting from the Proposed Action would both be low. The Proposed Action, as it relates to the KM, would result in negligible short-term adverse public health effects for 2 years of continued mining. A possible exception would be the potential health impacts on the sensitive subpopulations with existing conditions that could be exacerbated by slight increases in $PM_{2.5}$ emissions. The long-term effects on public health would be the same as those under the No Action alternative following mine closure.

Economy and Community Health

Community health impacts related to socioeconomics would be similar to those discussed above as direct effects (also see Section 3.15, Socioeconomics and Environmental Justice).

Traditional lifestyles could be impacted, which could impact the general well-being of the local community for an additional period compared to the No Action alternative. The likelihood of occurrence and the magnitude or consequence of the health impacts are low because there would not be a substantial increase in ground disturbance or mined area expansion (OSMRE 2017). After the KM mining operations cease in response to NGS retirement, the long-term effects would be identical to those under the No Action alternative.

Public Safety and Noise

Sensitive noise receptors, including residents who live near or within the KM permit boundaries, near mine roads, and within range of warning signals for blasting during mining operations, would continue to experience noise from mining activities under the Proposed Action. Noise from a point source decreases rapidly with increasing distance. No blasting or mine operations would occur within 0.5 mile of a receptor. Thus, noise levels for residential receptors would be even lower. Therefore, the magnitude or consequence of the health impact associated with noise and vibrations resulting from mining operations is low because some impacts on overall well-being and health, as well as quality of life, might occur for those few residents located nearby. The likelihood of the effect is high because of the daily mining operations and the regular and frequent blasting schedule. This would be short-term, however, as KM operations would cease before the NGS is retired, and reclamation activities would commence.

The current health and safety practices at the KM would continue. Regulatory changes in health and safety requirements would be included in standard operating procedures, and compliance with mandated safety rules would continue to be required. Similar safety risks would continue to be present. The opportunity for accidents due to working directly with or close to large equipment would also be present. Blasting operations would continue with pre-blast surveys conducted as requested. The mine would continue to provide emergency health care services to the workforce and local residents, and neither the type nor quantity of any wastes generated and disposed of by the mine would change. These impacts on public health and safety would be negligible. Once the KM mining operations cease, the long-term effects would be the same as those under the No Action alternative.

Hazardous Materials

The most used product at the KM would continue to be diesel fuel until the KM ceases operations and reclamation activities are complete. The risk of a transportation incident would be low but would be increased due to the additional period of operation compared to the No Action alternative. If an accident resulting in a release should occur, the impact would be anticipated to be negligible to minor depending on the location of the release. Therefore, potential effects would be negligible. After the KM mining operations cease in response to NGS retirement, the long-term effects would be identical to those under the No Action alternative.

3.13.5.3.3 STS and WTS on Navajo Tribal Trust Lands

Under the Proposed Action, the operation and maintenance of the STS, WTS, and communication sites would continue for 35 years until the end of the Extension Lease term in 2054. At the end of the Extension Lease term, there would be an automatic one-time extension option for 2 years to allow for retirement of the two transmission systems on Navajo Tribal Trust Lands, or for an additional 35 years of operation and subsequent retirement. Maintenance activities for the transmission lines, communication sites, and access roads would result in exhaust emissions and fugitive dust emissions from vehicle traffic on unpaved roads. However, these activities would be infrequent, of short duration, and localized, and impacts on health and safety would be minimal (see Section 3.3.4.2.3). As explained in Section 3.13.4.5.3, there are no sensitive receptors within 200 feet of the transmission lines, and no impacts from electromagnetic fields or noise are anticipated. When the STS and WTS are retired, effects would be the same as those under the No Action alternative described in Section 3.13.5.2.3.

3.13.5.4 Project Impact Summary—All Project Components

The impacts on human health from all project components are negligible because the potential cancer and noncancer risks are considered acceptable, and the Proposed Action and No Action alternative would have nearly identical results that would occur at slightly different times. The public health evaluation concluded that potential effects from all project components would result in negligible health impacts on the general population of the affected community. Overall, the public health evaluation and the HHRAs concluded that major benefits to public health due to positive impacts on the socioeconomic conditions of the community could be achieved through implementation of the Proposed Action, which would result in some level of continued revenue sources to the Nation and Hopi Tribe beyond the No Action alternative.

Potentially negative impacts on the well-being or psychosocial health of the residents living within or near the KM mining zones was identified for the KM operations due to the emotional stress caused by relocation of residents and the health effects associated with the annoyance and nuisance of the noise generated through blasting and mining operations. The HHRA and public health evaluation collectively concluded that potential impacts on the environment would result in short-term negligible health impacts on the general population of the affected community because the NGS and the KM would not operate for a substantially longer period of time beyond the No Action alternative. Emission-producing activities related to the transmission systems would be infrequent, of short duration, and localized, and impacts on health and safety would be minimal in the No Action and Proposed Action alternatives.

3.13.6 Cumulative Effects

The total human health impact from baseline (current environmental conditions), Proposed Action, and non-project-related regional and global emission sources (i.e., other cumulative sources, including non-U.S. sources characterized using mercury deposition data from the EPRI San Juan River Basin study [EPRI 2016]) were included in the HHRA to evaluate total cumulative impacts.

The estimated excess lifetime cancer risks were conservatively calculated based on a 5-year exposure duration for child and adult receptors separately, as discussed in the KM 5-Year Permit Renewal and NGS HHRA Report (Ramboll Environ 2016e). The estimated excess lifetime cancer risks for all receptors at the NGS are within or below the EPA acceptable cancer risk range of 1×10^{-4} to 1×10^{-6} and require no further action. The chronic HI estimates for the resident, resident gardener, resident farmer, and commercial worker are less than or equal to the EPA benchmark of 1 and require no further action. The HI for the child recreational user is greater than the EPA benchmark of 1. The driving pathway for the child recreational user is exposure to methylmercury via consumption of fish. Note that AGFD issued a fish consumption advisory in 2012 recommending that people, including pregnant women and children, limit their consumption of striped bass caught in the southern portion of Lake Powell (AGFD 2012b), which is the major surface waterbody to which a recreational user may be exposed. Based on the noncancer hazard

of 2 for the ingestion of fish by the recreational user under the NGS Total Cumulative Impact scenario, a low impact on human health was identified. The impact is considered minor because of the fish advisory that likely limits the consumption of fish (AGFD 2012b).

According to the HHRA for the KM EA (Flatirons Toxicology Inc. 2016), the baseline human health conditions include historic accumulation of contaminants in soils, and the modeling for the Proposed Action assumes long-term (future) exposure. The total cumulative action (baseline + Proposed Action + other cumulative sources) human health risk exposure scenarios were all indistinguishable from baseline in terms of the non-cancer HI. The total cumulative action hypothetical cancer risk estimates in the KM EA were slightly higher than the baseline at a maximum of 3 in 1,000,000 for the adult case to 8 in 1,000,000 for the child case, which are well within the EPA acceptable cancer risk. Therefore, there would be negligible cumulative effects on human health. Cumulative effects for safety are expected to be minimal. Cumulative public health issues within the analysis area are compounded by the use of wood or coal as an indoor fuel with inadequate domestic facilities.

3.14 Cultural Resources

This section describes the affected environment and environmental consequences for cultural resources in the analysis areas potentially affected by continued operation and retirement activities. The regulatory framework and analysis areas (areas of potential affect [APE]) are presented first, followed by descriptions of the affected environment. This section concludes with environmental consequences describing the direct, indirect, and cumulative effects of the Proposed Action and the direct and indirect effects under the No Action alternative. As summarized in Section 3.1.1, because the KM has already undergone environmental compliance with OSMRE, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

Cultural resources is the term used by practitioners in the identification, evaluation, and treatment of tangible locations of human activity, occupation, or use that have been identified through field survey, historical documents, or oral evidence. Cultural resources include archaeological sites and districts; historical architectural resources (buildings, structures, and districts); and places of religious and cultural significance (including sacred sites) to cultural groups, including Indian tribes. Federal agencies are required to consider the effects of their undertaking on cultural resources per Title 54 USC 306108, commonly referred to as the NHPA, as implemented through 36 CFR Part 800. Sites listed on or eligible for listing on the National Register of Historic Places (NRHP) are defined in regulations as historic properties and are evaluated for project effects under environmental consequences.

3.14.1 Regulatory Framework

Federal historic preservation legislation provides a legal framework for documentation, evaluation, and protection of cultural resources that may be affected by federal undertakings. For the Extension Lease, Reclamation is the lead federal agency responsible for disclosing potential effects on historic properties under the NHPA process. Reclamation would coordinate with BIA and the Navajo Tribal Historic Preservation Offices. OSMRE would be responsible for undertakings related to the KM under its 5-year renewal project.

Historic properties are districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture that are listed or eligible for listing in the NRHP. Under NEPA, only historic properties are considered under environmental consequences. Historic properties can include sites of religious and cultural significance to an Indian tribe that meet the NRHP criteria. Properties of religious and cultural significance are usually referred to as Traditional Cultural Properties (TCPs).

36 CFR Part 800 is the Advisory Council on Historic Preservation's (ACHP's) regulation implementing Section 106 of the NHPA. Part B of the regulation (36 CFR Part 800.3-800.6) establishes a process through which historic properties are identified and evaluated for significance, as follows:

- Initiate the Section 106 process by establishing the undertaking and consulting with the appropriate parties, including federal agencies, State Historic Preservation Offices, Tribal Historic Preservation Offices, Native American tribes that have interest in the APE, local governments, and the public.
- Identify historic properties within the APE through inventory and evaluation of their historic significance by applying the NRHP criteria. (See 36 CFR Part 60.4 for NRHP criteria, National Register Bulletin 15 for the process of determining if a property is eligible for listing on the NRHP, and National Register Bulletin 38 for evaluating and documenting TCPs.)
- Assess whether there would be effects on historic properties in the APE by applying the criteria of effects.
- If effects would occur, take appropriate steps to resolve those effects.

Of particular importance to the Extension Lease is a requirement of 36 CFR Part 800 (and a 1992 amendment to the NHPA) that a federal agency must consult with Indian tribes concerning properties of religious and cultural significance that may be eligible for listing in the NRHP. National Register Bulletin 38 defines a TCP as a property eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that (1) is rooted in that community's history and (2) is important in maintaining the continuing cultural identity of the community. Native American consultation includes identification of tangible properties of traditional cultural importance that include but are not limited to physical locations associated with the traditional beliefs concerning tribal origins, cultural history, or the nature of the world, and locations where religious practitioners go, either in the past or present, to perform ceremonial activities based on traditional cultural rules or practice.

Information specific to cultural resources of religious and cultural significance is restricted from public knowledge to protect these locations. Discussion of TCPs within this document is general and will not provide specific details or locations unless the property is already publicly known.

In addition to NHPA Section 106 requirements, federal agencies must meet the requirements of several laws, regulations, EOs, and other federal authorities. Among these are the Archaeological Resource Protection Act (ARPA) of 1979, the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), SMCRA, Secretarial Order No. 3175: Departmental Responsibilities for Indian Trust Resources, EO 13007: Indian Sacred Sites, and EO 13175: Consultation and Coordination with Indian Tribal Governments.

3.14.2 Analysis Areas

The APE for cultural resources includes NGS and KM components on Navajo Tribal Trust Lands and Hopi lands that may be directly or indirectly affected by retirement activities, including:

- NGS plant site (including ash [CCR] and asbestos disposal areas, lake pump facility and associated pipeline and powerline, access roads, and potential new landfill)
- KM coal conveyor and associated equipment
- BM&LP Railroad ROW
- STS ROW located on Navajo Tribal Trust Lands (and associated access roads)
- WTS ROW located on Navajo Tribal Trust Lands (and associated access roads)
- Communication sites (Preston Mesa, Zilnez Mesa, and Jack's Peak)

3.14.3 Affected Environment

Information and data on cultural resources were provided by SRP; in consultation with Reclamation, SRP sponsored cultural resource inventories or studies of all project components.

The Class I Cultural Resources Inventory (Class I Inventory) report (Graves 2015) produced for the NGS-KMC Draft EIS discloses potential data gaps within the current analysis area, which are further discussed below; these are then followed by recommendations under Environmental Consequences to mitigate potential data gaps.

The cultural-historical overview below is intended to provide a context for the cultural resource findings under each project component. The context is derived from the Class I Inventory that was produced for the NGS-KMC Draft EIS (Graves 2015). The cultural-historical periods used here provide a temporal sequence derived from the larger archaeological record in the Kayenta region.

The analysis area primarily comprises Navajo Tribal Trust Lands with some Hopi lands; the Zuni also consider these lands within their traditional area. The extensive land-use practices of the Hopi and Zuni, especially those related to religious practices and long-distance travel and trade, occurred within the

traditional territory of the Navajo (Graves 2015). Although the Zuni do not have reservation lands within the study area, there may be sites important to the Zuni present on these lands.

3.14.3.1 Cultural History

The following cultural history of the Kayenta region is derived from the Class I Inventory written for the NGS-KMC Draft EIS (Graves 2015).

3.14.3.1.1 Paleoindian Period

Within the areas intersected by the Extension Lease, the beginning dates of the Paleoindian Period range from 11150 to 9950 BC. Ending dates for this period range from 10850 to 7050 BC. The Paleoindian Period occupation of the region generally is represented by rare surface or isolated finds of large lanceolate projectile points found throughout the U.S. Southwest and the Great Basin. Archaeological evidence of the period indicates the existence of an adaptation based on the hunting of large game that concentrated on extinct Pleistocene species of mammoth (*Mammuthus* spp.), bison (*Bison* spp.), and other megafauna. Paleoindian Period hunter-gatherers' use and occupation of the entire region was sporadic and generally reflects occasional hunting forays into the area by small, mobile groups following the migratory corridors of large game.

3.14.3.1.2 Archaic Period and Basketmaker II/Terminal Archaic Period

Based largely on changing projectile point styles and artifact-assemblage variability, the Archaic Period across the analysis area is divided into three temporal categories: the Early (9050 to 7000 BC to 5550 to 4250 BC), Middle (5500 to 3500 BC to 2650 to 2000 BC), and Late (2600 to 2000 BC to 400 BC to AD 400) Archaic Periods. The ranges in the beginning and ending dates of these periods reflect the variation in the changes in the archaeological record that form the basis of the dating of these periods among the cultural-environmental areas traversed by the analysis area. In the Kayenta Area, a preceramic Basketmaker II Period (AD 1 to 500) that overlaps the Late Archaic Period has been defined.

During the Early Archaic Period, human groups began to rely less on big game hunting and more heavily on plant and small animal resources for subsistence. Overall, the record of the Early Archaic Period reflects an adaptation focusing on wetland resources and a wide variety of hunted and gathered resources that required relatively little storage and processing such as grinding, roasting, or parching. The density of Early Archaic Period sites across the footprint of the study area is low.

There is an increase in the frequencies of sites and isolated surface projectile points that date to the Middle Archaic Period. This increase in sites and points may indicate an increase in the size of populations occupying these areas and a more intensive use of the landscape. A focus on plant processing also is evident in the observed increase and elaboration of ground stone implements recovered from Middle Archaic Period sites. Overall, the archaeological record of the Middle Archaic Period reflects a hunter-gatherer adaptation where people were still reliant on hunting but were becoming more generalized in their subsistence pursuits and were exploiting a wider variety of food resources compared to earlier periods.

Subsistence and settlement practices apparently continued to intensify during the Late Archaic and Basketmaker II Periods throughout the U.S. Southwest. The frequency of sites appears to increase dramatically from the Middle Archaic Period to the Late Archaic Period, and sites consist of a wide variety of types including caves and rock shelters, rock art, and open-air artifact scatters. The Late Archaic Period also was a time of residential stability and the formation of village settlements of hunter-gatherers and farmers. Settlement permanency and subsistence strategies intensified during this period, with an increasing reliance on big game hunting and more intense plant use and processing. The period witnessed decreasing residential mobility and the formation of relatively stable residential campsites.

As early as 2000 BC, domesticated crops arrived in the U.S. Southwest, and groups began to practice agriculture. In the Kayenta Area, a Late Archaic Period hunter-and-gatherer economy may have existed that was contemporaneous with more agriculturally focused groups dating to the Basketmaker II Period. The possibility of Late Archaic/Basketmaker II Period hunter-and-gatherer groups and early agricultural groups functioning concurrently also has been suggested in southern Arizona as that region also experienced profound cultural changes during the Late Archaic Period, including the adoption of domesticated plant resources such as maize. The existence of roughly contemporaneous hunter-gatherer and farming subsistence strategies during the end of the Late Archaic Period and during the Basketmaker II Period may indicate that different cultural groups inhabited each of the cultural-environmental areas traversed by the study area, or it may indicate that human groups practiced diverse settlement and subsistence strategies and did not rely exclusively on either farming or hunting-and-gathering.

3.14.3.1.3 Ceramic Period

The widespread adoption of ceramic technology and the intensification of agricultural practices are hallmarks of the Ceramic Period throughout the study area. The chronology of the Ceramic Period in the Kayenta Area consists of the Basketmaker III Period (ca. AD 550 to 850), the Pueblo I and II Periods (ca. AD 850 to 1150), and the Pueblo III Period (ca. AD 1150 to 1300) (the subsequent Pueblo IV Period [ca. AD 1300 to 1600] is discussed below as part of the Late Prehistoric/Protohistoric Period). The Basketmaker III Period witnessed substantial changes in technology, architecture, settlement, and construction throughout the Kayenta Area, including the widespread adoption of ceramics; farming of maize; adoption of bow-and-arrow technology; construction of larger, more permanent pit houses; and more formal settlement layouts. The Pueblo I Period is characterized by the addition of aboveground masonry storage rooms, ceremonial pit structures or kivas, and formalized site configurations known as unit pueblos. During the Pueblo II Period in the Kayenta Area, kiva construction became more standardized, and aboveground masonry or jacal (wattle-and-daub) habitation structures were more commonly constructed. By about AD 900, population in the area peaked, and settlements were more numerous and widespread. At the beginning of the Pueblo III Period (AD 1150), many of the outlying parts of the Kayenta Area, such as the Grand Canyon, western Glen Canyon, and northern Black Mesa areas, were abandoned, and populations were concentrated in several core areas, including Long House Valley, Marsh Pass, Tsegi Canyon, Rainbow Plateau/Navajo Mountain, Canyon de Chelly, and the Hopi Buttes. By the end of the Pueblo III Period (ca. AD 1275 to 1300), the Kayenta Area, along with the overall San Juan Basin, was largely depopulated, and many Kayenta groups left their homeland and emigrated to the Hopi Mesas, the Homol'ovi area of the Little Colorado River, and beyond.

3.14.3.1.4 Late Prehistoric/Protohistoric Period

The Late Prehistoric/Protohistoric Period in the U.S. Southwest was a time of important cultural change. Major population movements and abandonments beginning ca. AD 1300 characterize much of the study area. The end of the Late Prehistoric/Protohistoric Period is defined by the arrival of the Spanish into the U.S. Southwest, but the dates for this incursion vary across the overall study area.

In the Kayenta Area, the Late Prehistoric/Protohistoric Period begins with the Pueblo IV Period (ca. AD 1275 to 1300) and ends with the arrival of the Spanish (ca. AD 1540 to 1600). The Pueblo IV Period was a time of extensive population dislocation, migration, and aggregation. Aggregated villages that characterized the Pueblo IV Period surpassed the largest of the Pueblo III Period settlements in size, and these villages were almost always parts of larger settlement clusters. The Hopi Mesas are located at the extreme southern end of Black Mesa. The villages of the Hopi are arranged in three main groups: First, Second, and Third Mesas. Each Hopi Mesa is a distinct settlement cluster that consisted of a primary village associated with several smaller villages. A fourth settlement cluster centered on the village of Awatovi is on Antelope Mesa just southeast of First Mesa; Antelope Mesa was abandoned after AD 1700. The Hopi Mesas have been continuously occupied since ca. AD 1200.

After the post-1300 abandonment of large parts of the Kayenta Area by Anasazi/Ancestral Pueblo groups, Athabaskan-speaking groups arrived in the area. The exact timing of this arrival is debated, mostly because of a lack of archaeological data, although most scholars believe they arrived in the northern portion of the U.S. Southwest sometime between AD 1450 and 1500. By AD 1600 to 1650, a distinct and identifiable Navajo culture emerged in the Dinétah, the Navajo homeland, located in northwestern New Mexico. By AD 1700, the Navajo occupation of Dinétah was well established, and the Navajo lived in forked-pole hogans and constructed masonry pueblitos; they farmed maize, beans, and squash and raised sheep, goats, and horses.

Oral tradition places the Navajo, Hopi, and Zuni within the analysis area over a long period of time. Current archaeological evidence places the Navajo in the southwestern U.S. by the early 16th century (Towner 1996; Wilshusen 2010) with circumstantial evidence for their arrival as early as the 14th century (Gilmore and Larmore 2012) or even earlier through the amalgamation of different peoples (Brugge 2012). Archaeological investigations on Black Mesa place the arrival of the Navajo in northeast Arizona by the early 1800s (Colwell and Ferguson 2017; Powell and Smiley 2002). The Hopi, Zuni, and certain Navajo clans are descendants of the Ancestral Puebloans, who have lived in the Southwest for at least the last 3,000 years and most likely much longer (Reed 2000). Current information indicates the Hopi occupied the southern tip of Black Mesa (known as First, Second, and Third Mesas) since the early 13th century.

3.14.3.1.5 Historic Period

The portions of the U.S. Southwest that are traversed by the study area share common elements of historical period development. The entire region has been witness to numerous Spanish, Mexican, and American exploration efforts. Exploration began with early Spanish colonial forays of the mid-1500s and early 1600s, and though the Spanish used travel and supply routes through the region, they implemented only limited colonization efforts. Commercial trade on the routes was encouraged under Mexican rule in the 1800s.

Surveys and expeditions by the U.S. government in the last half of the 19th century provided mapping and information critical for settlement in the American Period. The establishment of local roads in the late 19th and early 20th centuries was critical for the success of remote ranches, mines, and settlements. The growing population of the desert U.S. Southwest required an increasingly complex and dependable transportation system of roads, highways, and railroads linking water sources and connecting population centers. Similarly, electrical transmission lines and communication systems provided necessary infrastructure for the region where settlements were often separated by long distances and away from crucial resources.

Resource discovery and extraction played a major role in the more recent history of the U.S. Southwest. Prospectors spread across the region in search of precious metals after the excitement of the California Gold Rush waned. Settlers took advantage of homestead laws enacted during the late 19th century; consequently, most of the available arable land with water sources was appropriated. The earliest settlements were limited to areas with reliable water sources, but settlers learned to modify the landscape as well as use traditional farming and ranching techniques to improve success under harsh conditions. Mormon colonies were formed throughout the West including northern Arizona, southern Nevada, and southern Utah. The establishment of national forests by the U.S. government and the rise of mining and timber industries fueled both economic and population growth throughout the larger region, facilitating ranching, farming, and industry in remote areas. At the end of the 19th century, regional ranching efforts expanded beyond a subsistence economy into commercial farming and stock raising. Increasingly complex water management developments in the late 1800s and early 1900s ranged from local work by irrigation cooperatives to federally funded dams and hydroelectric plants.

3.14.3.2 NGS and Associated Facilities

The affected environment for the NGS includes the plant site, ash (CCR) disposal area, access road between the plant and ash (CCR) disposal areas, and lake pump facility and related access road, power line, and pipeline. Although the BM&LP Railroad is considered part of the NGS, it is discussed separately in terms of affected environment and environmental consequences. The NGS components previously listed comprise about 1,872 acres. The preliminary survey report for the NGS was recently located by SRP (Pilles 1969). The report implies that the entirety of the NGS was subject to survey, which located five archaeological sites and two modern Navajo sites. The report provides mapped locations for five of the seven sites, but the report does not describe any of the sites except one of the modern Navajo sites, and the report does not discuss how the survey was implemented.

Based on GIS data provided by SRP and the results of the Class I Inventory, only two previously recorded sites are located within the NGS (AZ K:5:17 and 18). A general location is known for site AZ K:5:17 (lake pump facility; also referred to as "pumphouse"), but no other data such as resource type and eligibility status are known; no information is known about site AZ K:5:18. The Class I Inventory (Graves 2015) identified three additional sites within the ash (CCR) disposal area; two of these sites (NA10724 and NA10725) were subject to data recovery excavation in the early 1980s and effectively no longer exist as cultural resources. The third site (NA10744) is an unexcavated early 20th century Navajo site (Graves 2015:7.10), but its location is also unknown. Three additional prehistoric sites are located within "ancillary facilities" and were reported to have been avoided by construction of the NGS; no other information is available (Graves 2015). Seven surveys were found to overlap the NGS APE, but all predate 2005, the threshold defined in the Class I Inventory for acceptable survey data (Graves 2015).

The NGS and associated facilities and structures have not been formally documented and evaluated for NRHP significance because they do not yet meet the 50-year age criteria guideline. Using a completion date of 1973, the NGS would not meet the 50-year age guideline until 2023.

Despite indications that at least some portions of the NGS were subject to inventory (e.g., ash [CCR] disposal area), the only other areas of the NGS that can be said to have been subject to inventory are those portions of the STS or WTS transmission lines and the BM&LP Railroad that extend into the NGS footprint. However, as noted under the BM&LP component (below), no modern survey of the railroad ROW has occurred since the original 1969–1971 survey. Therefore, excepting the railroad, a potential data gap exists as to whether cultural resources are located along the water line and within the NGS facility footprint. Per the NPS EA (2005), no cultural resources are located within the lake pump facility or access road. As the authors of the Class I Inventory (Graves 2015) note, given the high site density within the Kayenta region, there is potential for unknown cultural resources within the NGS.

3.14.3.2.1 BM&LP Railroad

The BM&LP Railroad ROW is about 1,520 acres and includes the Zilnez Mesa communication site, which is only used for the railroad. Data provided by SRP lists 65 sites within the railroad ROW, including 10 sites with unknown data, 2 sites recommended eligible, and the remaining sites having been subject to data recovery excavation prior to construction of the railroad. The Class I Inventory states that 62 sites intersect the ROW (Graves 2015). The only survey that covered the ROW was the original survey from 1969 through 1971 conducted prior to construction.

The BM&LP Railroad and related structures (e.g., catenary) have not been formally documented or evaluated as potential historic properties because the structures do not yet meet the 50-year age criterion. Based on a completion year of 1971, the structures would not meet the age criterion until 2021.

3.14.3.3 KM

The KM was surveyed for cultural resources between 1967 and 1983 as part of the larger Black Mesa Archaeological Project (BMAP) (Powell and Smiley 2002). These surveys varied in rigor but covered the entire extent of the KM Permit Area (OSMRE 2017). The Class I Inventory (Graves 2015) reports conflicting numbers of documented cultural resources within the BMAP, ranging from 2,622 sites to 2,735 sites, while the KM EA reports 2,710 sites (OSMRE 2017). PWCC has also sponsored 21 TCP studies within their Permit Area and conducted 23 homesite surveys for relocated Navajo residents.

Through BMAP, historic properties within active coal resource areas have already been mitigated, where necessary.

As discussed in Section 2.3.1.1, KM components considered under the No Action alternative include the coal conveyor and associated equipment. The conveyor easement is about 5 miles long and consists of about 66 acres. With the approximate 100 acres of rail loadout silos (RLS) locations, the total APE for both the conveyor and silos is about 166 acres.

Data provided by SRP indicates that 4 archaeological sites along the conveyor were subject to data recovery excavation and that 10 archaeological sites are located within RLS locations; 9 of these sites were subject to data recovery excavation, and 1 site has no associated information. These data indicate the coal conveyor and associated equipment were subject to inventory at some point, likely prior to construction in the late 1960s or early 1970s. The completion dates for the coal conveyor and associated equipment remain unknown but are likely the same as the completion date of the BM&LP Railroad (1971). Based on a completion year of 1971, the structures would not meet the age criteria until 2021.

Previous ethnographic studies identified Black Mesa as a landscape important to the Navajo and other tribes. Although the eligibility of Black Mesa as a TCP has not been formally consulted upon, the landscape is treated as a TCP.

3.14.3.4 STS and WTS on Navajo Tribal Trust Lands

3.14.3.4.1 STS

The two parallel STS lines are 256 miles long and are located entirely in Arizona. The length of the two parallel STS lines on Navajo Tribal Trust Lands is about 101 miles or 3,919 acres of ROW. The first 101 miles of the STS and two of the associated communication sites are located on Navajo Tribal Trust Lands (Jack’s Peak and Preston Mesa). The cultural resource survey reported about 96 miles or about 4,191 acres surveyed for cultural resources. A total of 67 sites, 2 in-use properties, and 163 isolated occurrences were reported (Laurila et al. 2011). Data provided by SRP indicates two additional sites documented by the Nation and the Museum of Northern Arizona, for a total of 71 sites on Nation lands. Documented sites include 31 historic Navajo sites, 34 prehistoric sites, and 5 multicomponent sites with both historic and prehistoric occupations. All of the historic sites but one are Navajo and include artifact scatters with features, abandoned habitation sites, trash dumps, one sweat lodge, and one related road. Of the Navajo sites, 24 either are not evaluated (require further work to determine NRHP significance) or are recommended eligible for listing in the NRHP. Highway 89 is also crossed by the STS and is recommended eligible. A total of 34 prehistoric archaeological sites are within the STS ROW, 6 with unknown affiliation and 28 assigned to the Anasazi. Only 1 of the 34 prehistoric single component sites is recommended not eligible; the remaining sites are either unevaluated or are recommended eligible for listing on the NRHP. The five multicomponent sites have prehistoric and Navajo occupations, and all are recommended eligible for listing on the NRHP. One remaining site (AZ C:15:3) has no accompanying data.

Access roads servicing the STS ROW on Navajo Tribal Trust Lands have not been subject to cultural resource inventory. Inventory would occur for access roads once a potentially ground-disturbing, project-specific action is identified.

In summary, the STS component has 69 sites within the APE of the Extension Lease. A total of 58 sites are potential historic properties and require consideration of effects if subject to ground disturbance.

3.14.3.4.2 WTS

Only 2 miles or about 41 acres of the WTS is located on Navajo Tribal Trust Lands. Recent survey by Logan Simpson Design (Terlep 2016) documented only three isolated occurrences along the ROW on Navajo Tribal Trust Lands. Isolated occurrences are not eligible for listing in the NRHP and will not be considered further under environmental consequences.

Per the Class I Inventory (Graves 2015), access roads servicing the WTS ROW on Navajo Tribal Trust Lands have not been subject to cultural resource inventory. Inventory would occur for access roads once a potentially ground-disturbing, project-specific action is identified.

Communication Sites

Three communication sites are on Navajo Tribal Trust Lands: Jack's Peak, Preston Mesa, and Zilnez Mesa. These three locales together comprise less than 3 acres; existing access roads to Jack's Peak and Preston Mesa serve other, unrelated facilities at these locations. Jack's Peak and Preston Mesa are related to STS, and Zilnez Mesa would be retired with the NGS, unless the Nation chooses to retain this site.

Based on the Class I Inventory, Jack's Peak and Preston Mesa have been subject to previous survey, but Zilnez Mesa has not been surveyed. The Class I Inventory is unclear whether the previous surveys that overlap Jack's Peak and Preston Mesa fully covered their footprints. Regardless, the authors of the Class I Inventory recommend survey for all three sites (Graves 2015). Previous cultural resource survey did not locate any cultural resources within the footprints of Jack's Peak or Preston Mesa.

The Class I Inventory (Graves 2015) identified Preston Mesa as a Navajo TCP.

3.14.4 Environmental Consequences

The primary potential direct effect on historic properties is from ground disturbance related to retirement activities, which could include structure demolition and removal, ground surface rehabilitation to conditions described in the Retirement Actions (see Section 2.4.1.1), remediation, activity staging, and new access.

As noted in Section 2.4.1.1, the Retirement Actions' approach is similar to the Proposed Action's Retirement Guidelines (SRP 2017c) and would guide the specific retirement activities under the No Action alternative. The following activities are assumed to occur under either the No Action or Proposed Action alternative:

- The NGS powerblock, stacks (chimneys), cooling towers, and other infrastructure would be demolished
- The NGS plant administrative buildings would be retained by the Nation
- The ash (CCR) disposal area would be capped
- The landfill would continue to function
- The asbestos landfill would be removed
- The lake pump facility and associated water line and power line would be retained by the Nation

- The BM&LP Railroad would be preserved by the Nation (but the catenary would be removed)
- The coal conveyor and associated equipment would be removed
- Transmission systems would remain in place

3.14.4.1 No Action Alternative

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.

Under the Existing Lease, the Nation would have the right to retain certain NGS facilities; in addition, the NGS participants would coordinate with the Nation to identify all infrastructure to retain. The Nation has indicated that they will retain the NGS the lake pump facility and water and power lines, the BM&LP Railroad, fences, and air monitoring equipment.

Because the No Action alternative is not a federal undertaking, Section 106 compliance would not be required, and potential effects on historic properties from the No Action alternative would not be further considered. Under provision of the Existing Lease, the Navajo Nation Cultural Resources Protection Act of 1988 would not apply.

3.14.4.1.1 NGS and Associated Facilities

Retirement of the NGS and its associated facilities, except the coal conveyor and associated equipment, would be implemented essentially as described under the Retirement Actions (see Section 2.4.1.1), except that retirement would begin no later than January 2018 and be completed by December 2020. Upon completion of retirement, lands would be restored as described in Section 2.4.1.1. The NGS and associated facilities would be subject to 30 years of remediation and long-term monitoring, which would require a separate agreement to provide access for these activities.

The results of the Class I Inventory (Graves 2015) indicate that, although previous cultural resource surveys occurred within the NGS, there is little supporting data to identify the location of the surveys, the quality of the surveys, and the results of these surveys to evaluate potential effects on historic properties. Areas would be surveyed prior to disturbance for decommissioning activities. Continued operating and maintenance would not have an effect on historic properties; however, should there be ground-disturbing activities (e.g., new solid waste landfill), SRP would consult with the Navajo Nation Historic Preservation Officer. If cultural sites are located and could not be avoided during retirement activities, SRP would coordinate with the Nation to determine appropriate mitigation. Because the NGS facilities not retained by the Nation would be removed by 2020, they would not meet the 50-year age criterion; thus, retirement activities under the No Action alternative would have no effect on historic properties.

BM&LP Railroad

In discussions with SRP, the Nation has indicated that they would likely preserve in place the BM&LP Railroad; the associated catenary would be removed, however.

Per the Class I Inventory (Graves 2015), the entire railroad ROW was subject to survey, documenting between 62 and 65 cultural resources. Construction of the railroad likely destroyed much of the original ground surface within the ROW, limiting or even precluding the potential for intact historic properties.

Regardless, because the Nation has indicated that they will preserve the railroad in place, no effects on historic properties within the ROW are anticipated.

3.14.4.1.2 KM

KM components considered for indirect effects under the No Action alternative include the coal conveyor, silos, and rail loadout sites. PWCC would cease mining coal when NGS operations cease. The conveyor and associated equipment would be removed per SMCRA reclamation requirements. Mining reclamation activities would continue in areas where mining had previously concluded, would begin in areas where active mining ceased, and could continue through 2035. The retirement and removal of KM components would not be a federal undertaking subject to Section 106 compliance.

The results of the Class I Inventory (Graves 2015) indicate that, although a previous survey occurred within the coal conveyor easement and associated equipment disturbance areas, there is little to no supporting data to identify whether historic properties exist within the ROW of KM components. Therefore, retirement activities under the No Action alternative would have an unknown effect on historic properties within the KM components. Reclamation activities within mined or otherwise disturbed areas of the KM have been subject to Section 106 compliance precluding further compliance measures (OSMRE 2017). Unanticipated discovery protocol agreed to with the Nation and the Hopi would remain in place during reclamation activities.

3.14.4.1.3 STS and WTS on Navajo Tribal Trust Lands

The STS has 58 potential historic properties within the 200-foot ROW on Navajo Tribal Trust Lands. While it would be unlikely that the STS would be removed under the No Action alternative, should removal occur, potential ground-disturbing activities may include structure removal, activity staging within the ROW, and the use and improvement of access roads. The types of activities associated with line and structure removal could be planned to avoid adverse effects on potential historic properties. However, access roads and activity staging may require inventory to identify and evaluate potential effects on historic properties, if greater than routine ground disturbance is anticipated. If historic properties could not be avoided, APS, operator of the STS, would consult with the Nation and BIA, as appropriate, to mitigate the impacts.

No historic properties are located within the WTS ROW on Navajo Tribal Trust Lands. Access roads and activity staging may require inventory to identify and evaluate potential effects on historic properties, if greater than routine ground disturbance is anticipated. If sites could not be avoided, LADWP or NVE, operators of the WTS, would consult with the Nation and BIA, as appropriate, to mitigate the impacts.

If the STS and WTS continue to be operated, impacts on historic properties would be the same as under the Proposed Action. Section 106 compliance has already occurred for the ROWs, and any new activity that would deviate from normal use of access roads or O&M would require compliance with Section 106 as individual undertakings.

Communication Sites

Similar to the transmission systems, it would be unlikely that the communication sites would be removed because the Jack's Peak and Preston Mesa communication sites are shared with other operators and the access roads serve purposes other than the NGS; rather, the two communication sites would be decommissioned with little to no ground disturbance. Zilnez Mesa is not shared and would be removed and restored as part of the NGS. The presence of historic properties within the three communication sites remains unknown. If the three communication sites are to be removed, inventory to identify and evaluate potential effects on historic properties would be conducted if necessary by SRP or APS, operator of the Zilnez communication site and STS (Jack's Peak and Preston Mesa), respectively. If sites could not be avoided, SRP or APS would consult with the Nation and BIA, as appropriate, to mitigate the impacts.

3.14.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations unchanged until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period.

The Proposed Action is a federal undertaking that requires compliance with Section 106 of the NHPA. Reclamation, in coordination with BIA, would serve as lead federal agency for undertakings that take place on Nation lands. Specific requirements pursuant to Section 106 would be coordinated between Reclamation and BIA, and would consider the potential effects on historic properties from the Retirement Plan.

Under the Extension Lease, the Nation would have the right to retain any of the NGS facilities, including 500 MW of capacity from both the STS and WTS. The Nation has indicated that they would retain the NGS plant administrative buildings, the lake pump facility and water line, and the BM&LP Railroad.

3.14.4.2.1 NGS and Associated Facilities

The Class I Inventory (Graves 2015) indicates that the location of past survey and the locations of previously documented cultural resources within the NGS remain essentially unknown and recommends resurvey of areas of the NGS not previously disturbed and potentially affected by new ground-disturbing activity.

Reclamation and BIA have initiated consultation with the Navajo Nation Tribal Historic Preservation Officer (THPO) concerning on-the-ground retirement activities at the NGS site. Ongoing NGS operations would not result in any new land-disturbing activities. Once areas that are anticipated to be disturbed by retirement activities have been identified through the process described in the Extension Lease, a Class III survey will be undertaken as part of the Section 106 consultation. The Section 106 consultation would involve coordination with other interested tribes including, but not limited to, the Hopi Tribe and Pueblo of Zuni. Section 106 consultations would be undertaken prior to any land-disturbing activities. Retirement activities that cannot avoid historic properties will be evaluated for project effects prior to any land-disturbing activities, and any adverse effects will be resolved under a memorandum of agreement among the lead federal agencies, the Navajo Nation, SRP, and appropriate consultation parties.

Because the NGS facilities not retained by the Nation would be removed by 2021, they would not meet the 50-year age criteria for potential historic properties. Any decision to consider potential effects under Criterion Consideration G would be made by BIA.

BM&LP Railroad

Potential effects on historic properties from retirement activities within the ROW of the BM&LP Railroad would be the same as those under the No Action alternative. Therefore, there would be no effect on historic properties within the ROW during retirement (removal of the catenary and associated equipment). During operations between 2018 and 2019, activities would occur in areas that have been previously disturbed; thus, no effects on historic properties are anticipated.

3.14.4.2.2 KM

The OSMRE EA (2017a) concluded that unanticipated discoveries could occur during continued mining operations and remediation activities; effects on unknown historic properties would be short-term and adverse. Potential discoveries would be mitigated per existing Nation policy.

Continued operations and remediation of the KM would continue to affect Black Mesa as a TCP. However, effects on Black Mesa from the KM have already occurred. Once KM operations cease, reclamation and remediation activities would continue to adversely affect Black Mesa as a TCP. However, once reclamation and remediation activities have been completed, the effect of the Proposed Action on Black Mesa would be beneficial in the long term, including recharging the N-Aquifer, restoring the natural environment through reclamation, and restoring traditional land use.

3.14.4.2.3 STS and WTS on Navajo Tribal Trust Lands

Continued O&M of the STS and WTS would occur over the life of the Extension Lease, and ground-disturbing activities may be necessary. If historic properties cannot be avoided, the activities would be considered individual undertakings pursuant to Section 106, and APS or NVE would consult with BIA to determine if the actions would have the potential to affect historic properties and appropriate resolution and mitigation.

Potential effects on historic properties from retirement activities within the STS and WTS ROWs would be the same as those under the No Action alternative. Compliance surveys have taken place for both the STS and WTS ROWs on Navajo Tribal Trust Lands.

Section 106 compliance for STS and WTS ROWs has concluded, and no further identification efforts within the ROWs are necessary. Routine O&M of the transmission systems over the life of the Extension Lease will mirror existing O&M activities. If actions exceed current O&M activity types, or affect access roads that have not been previously surveyed, then the process outlined in Section 106 of the NHPA will be followed. When retirement of the transmission systems is considered, Reclamation will then determine if it has an action to take.

Communication Sites

Potential effects on historic properties from decommissioning of the communication sites would be the same as those under the No Action alternative. Continued operation of Jack's Peak and Preston Mesa in association with the STS would have an unknown effect on historic properties. Zilnez Mesa would be retired and restored by the end of 2024 along with the other NGS facilities, unless retained by the Nation. Prior to decommissioning and removal, all three communication sites would be evaluated pursuant to Section 106.

3.14.5 Cumulative Effects

Cumulative effects identified under the KM EA include the Manymules project and past and present mining. Section 106 compliance for the KM has concluded and protections are in place for unanticipated discoveries, which are estimated to be unlikely given the number of past occurrences. However, unanticipated discoveries would be mitigated following existing protocol between the Nation and OSMRE. Section 106 compliance may be required for the Manymules project, at which time effects on historic properties would be evaluated.

Ground disturbing activity anticipated from reasonably foreseeable future actions include the construction of water pipelines for the Hopi Arsenic Mitigation project and from capital projects anticipated under the Former Bennett Freeze integrated resource management plan. The BIA would implement Section 106 compliance for these federal undertakings in coordination with the Hopi and the Nation.

3.14.6 Mitigation

Retirement actions would be implemented to meet the standards set forth in the Retirement Guidelines (SRP 2017c) and terms of the Extension Lease. A more detailed Retirement Plan would be developed that describes how the retirement objectives, standards, and criteria would be achieved.

Under the Proposed Action, NGS buildings and infrastructure are less than 50 years old and would not require Section 106 consultation. Reclamation does not consider routine O&M to have an effect on historic properties, although SRP, as the operator, would consult with the Navajo THPO and BIA if an O&M activity requires ground disturbance in areas that have not been previously disturbed. Once areas that are anticipated to be disturbed by retirement activities have been identified through the process described in the Extension Lease, a Class III survey will be undertaken as part of the Section 106 consultation. The Section 106 consultation would involve coordination with other interested tribes including, but not limited to, the Hopi Tribe and Pueblo of Zuni. Section 106 consultations would be undertaken prior to any land-disturbing activities. Retirement activities that cannot avoid historic properties will be evaluated for project effects prior to any land-disturbing activities, and any adverse effects will be resolved under a memorandum of agreement among the lead federal agencies, the Navajo Nation, SRP, and appropriate consultation parties.

Section 106 compliance for STS and WTS ROWs has concluded, and no further survey is necessary to achieve compliance. Fifty-eight potential historic properties require consideration of effects from retirement or O&M. Routine O&M of the transmission systems over the life of the Extension Lease will mirror existing O&M activities. If actions exceed current O&M activity types, or affect access roads that have not been previously surveyed, then the process outlined in Section 106 of the NHPA will be followed. When retirement of the transmission systems is considered, Reclamation will then determine if it has an action to take.

3.15 Socioeconomics and Environmental Justice

This section describes the affected environment and environmental consequences for social, economic, and environmental justice in the analysis areas potentially affected by various components of the project. The analysis areas and regulatory framework are presented first, followed by descriptions of the affected environment. This section concludes with environmental consequences describing the direct and indirect effects of the Proposed Action and No Action alternatives, followed by cumulative effects. As summarized in Section 3.1.1, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

Relevant social and economic topics include population and demographics, social characteristics, and economic conditions that may be affected by the alternatives or are associated with the NGS or the KM. Electricity generated by the NGS for the CAP pump operations costs more than power that could be purchased under current and projected market values (IEEFA 2017a). The consequences of the NGS retirement would have socioeconomic implications on the Nation and Hopi Reservation and within the CAP water delivery area, including the CAP-affected Tribes. The proposed Extension Lease, which would extend the NGS operations 2 years through 2019, reduces the socioeconomic effects that would occur on the Nation and Hopi Reservation under the No Action alternative.

3.15.1 Regulatory Framework

When economic or social and natural or physical environmental effects are interrelated, as they are with the Proposed Action, all of these effects on the human environment are to be discussed; however, economic or social effects are not intended by themselves to require preparation of an EIS (40 CFR § 1508.14). Public participation opportunities, including scoping and dissemination of information to communities, are integral to compliance with EO 12898 (CEQ 1997; U.S. Department of the Interior 1995). EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires federal agencies to determine if minority communities and low-income communities would experience any disproportionate environmental, human health, or socioeconomic effects from actions requiring NEPA compliance (EPA 1994). Impacts on environmental justice populations may be different from impacts on the general population because of “interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical environmental effects of the proposed agency action” (CEQ 1997).

3.15.2 Analysis Area

The geographic area where most direct and indirect effects would occur includes tribal trust lands of both the Nation and the Hopi Tribe, and northern Coconino, Navajo, and Apache Counties, Arizona. The Navajo Tribal Trust Lands (or Nation) and Hopi Reservation in their entirety are included in both the direct and indirect effects analysis areas, as both the NGS and the KM are important sources of revenue that support tribal governments and social services across both communities. The indirect effects analysis area includes the counties where CAP-affected tribal communities are located.

CEQ guidelines specify that “Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis” (CEQ 1997). Both the direct and indirect analysis areas have sufficient minority populations and low-income populations to warrant consideration for environmental justice under EO 12898.

The direct effects analysis area for socioeconomics and environmental justice includes the geographic region that encompasses the greater NGS plant site, the BM&LP Railroad line connecting the KM and NGS plant, the STS and WTS on Navajo Tribal Trust Lands, and communities and areas surrounding

these facilities in northeastern Arizona. The direct effects analysis area includes communities where the employees of the NGS live and access social services, and where the direct economic and social effects from the alternatives would be experienced (Table 45 and Figure 18).

Table 45. 2010 Population and Approximate One-Way Travel Distances to the NGS and the KM.

Community	2010 Population	NGS (miles)	KM (miles)
Navajo Nation (Arizona portion)	101,835	--	--
Window Rock CDP (tribal headquarters)	2,712	227	159
Kayenta CDP	5,189	96	39
Tuba City CDP	8,611	76	61
Kaibeto CDP	1,522	33	51
Shonto CDP	591	60	41
Chinle CDP	4,518	162	94
LeChee CDP	1,443	6	86
Forest Lake (Chapter)	471	75	18
Hopi Reservation	7,185	--	--
Kykotsmovi Village CDP (tribal headquarters)	746	126	*60
Moenkopi CDP	964	75	60
Second Mesa CDP	962	136	*58
Coconino County	134,421	--	--
City of Flagstaff (county seat)	65,870	131	136
City of Page	7,247	5	85
Navajo County	107,449	--	--
City of Holbrook (county seat)	5,053	208	197

*Unpaved roads.
CDP = census designated place.
NA = not applicable.
Source: U.S. Census Bureau 2010.

Navajo Tribal Trust Lands encompass 17.5 million acres in Arizona, New Mexico, and Utah. Approximately 70 percent of the Nation is located in northeastern Arizona within Apache, Coconino, and Navajo Counties. The Hopi Reservation, which is located entirely in Arizona, is approximately 1.56 million acres within Coconino and Navajo Counties. Figure 18 shows the geographical location of the major project components, adjacent and nearby Nation chapters, the Hopi Reservation and villages, and the nearby communities.

The area where indirect socioeconomic effects would occur includes the KM, Nation chapters and portions of the Hopi Reservation surrounding the KM and coal conveyor, and communities where CAP water deliveries are made. Figure 19 shows the indirect effects analysis area including the communities where KM employees are likely to live and access social services, and the CAP-affected tribal communities. Note that there is some overlap between the geographic areas with direct and indirect impacts but these are not double-counted in the analysis.

The relationship between the federal government's partial interest in the NGS and operation of the CAP would result in indirect effects on social and economic conditions in central and southern Arizona that are far removed geographically, socially, and economically from the NGS site vicinity and leased Navajo Tribal Trust Lands. The indirect effects analysis focuses on the socioeconomic consequences of the Extension Lease on CAP recipients within Maricopa, Pinal, and Pima Counties, including the 10 CAP-affected Tribes (Figure 19), and on the potential effects on the Development Fund.

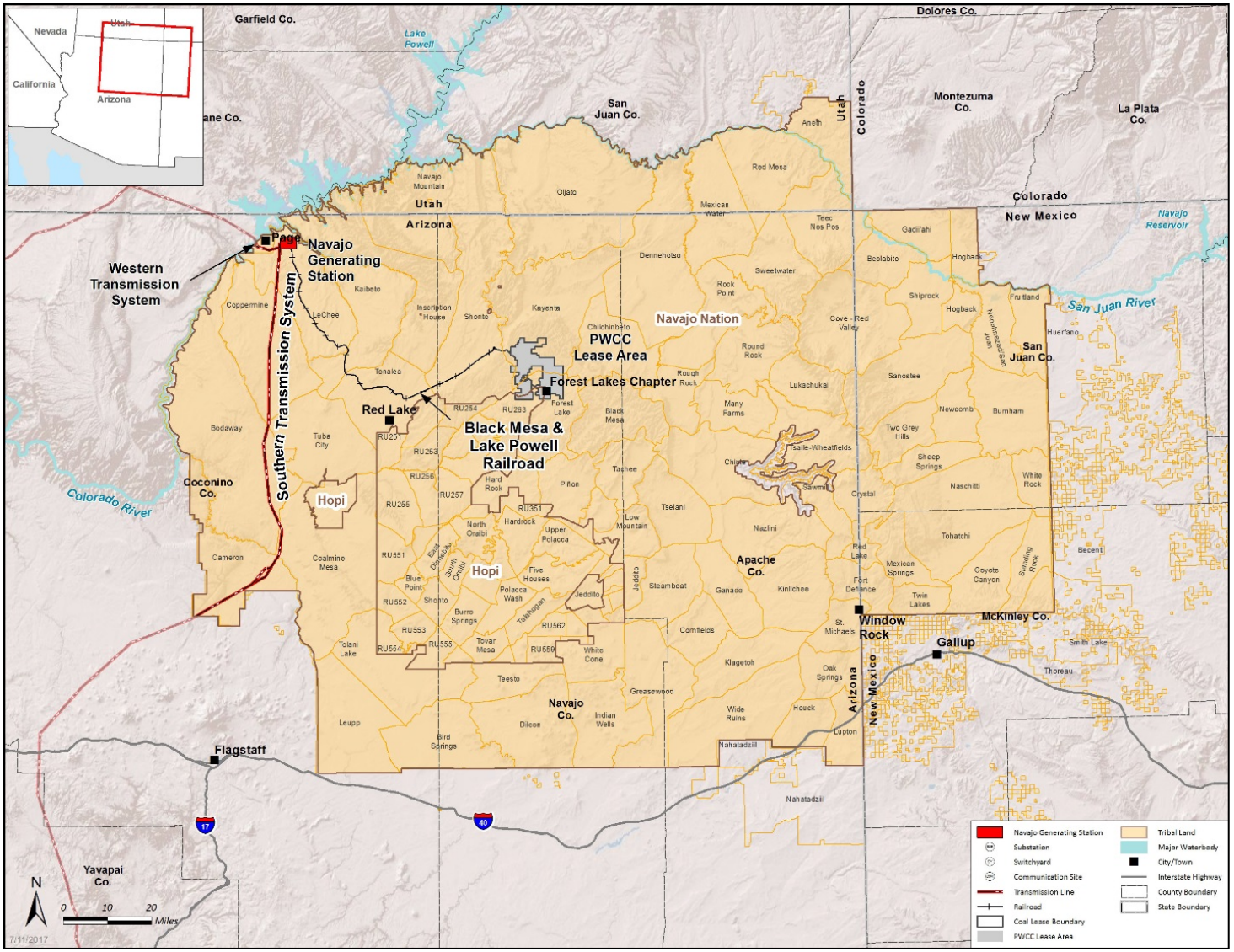

Figure 18. Socioeconomic and Environmental Justice Direct Effects Analysis Area.

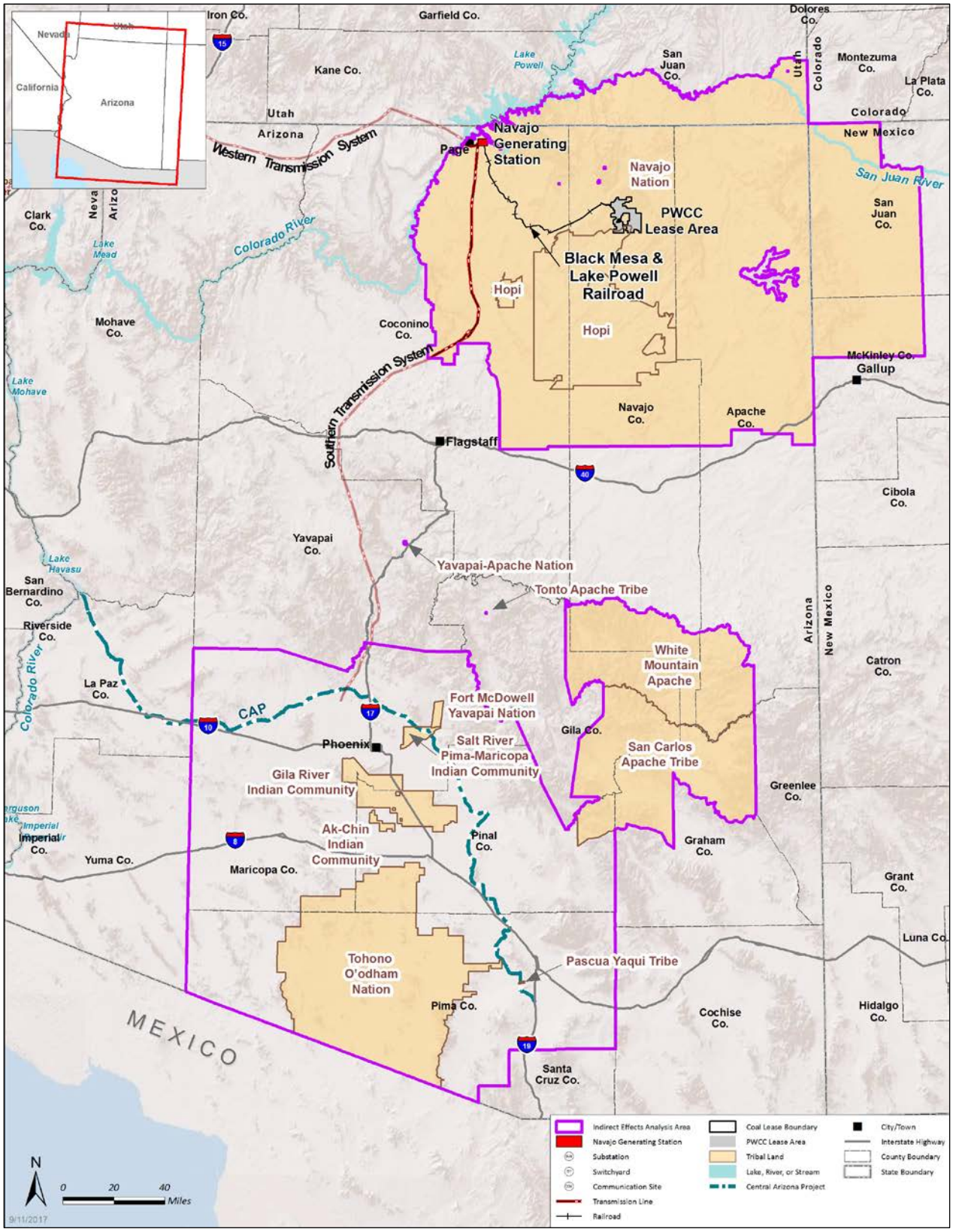

Figure 19. Socioeconomics and Environmental Justice Indirect Effects Analysis Area.

3.15.3 Affected Environment

This section describes the socioeconomic conditions for the direct and indirect analysis areas using reliable and publicly available information and data from tribal, state, federal, and independent sources and databases; notes and summaries of discussions with local and tribal officials and other stakeholders; local print media; and published studies on the social and economic conditions in the region. The most accurate, reliable, and recent data on socioeconomic characteristics and trends were used to formulate an understanding of the communities where effects from the alternatives would be experienced. Data from 2013 and 2014 serve as the base year for the analysis, although in some instances the data collection frequency and reporting lags result in using older data. All detailed demographic and population data are from the 2010 Census unless otherwise noted (U.S. Census Bureau [USCB] 2010a, 2010b).

3.15.3.1 Northeastern Arizona, Navajo Nation, and Hopi Tribe

3.15.3.1.1 Population and Demographics

As described in Section 1.2.5, the NGS is located in northern Coconino County, on tribal trust lands leased from the Nation. The nearest resident to the NGS is located approximately 1 mile southeast. About 75 percent of NGS employees live in the city of Page and in the LeChee and Kaibeto Chapters of the Nation (see Table 45). The BM&LP Railroad ROW passes through rural areas of the LeChee, Tonalea, and Shonto Chapters of the Nation. The ROW's closest proximity to existing communities is approximately 1 mile southwest of Kaibeto and just to the south of a settlement near the intersection of State Highway Route 98 and U.S. Highway Route 160. The NGS plant site and associated facilities, including the BM&LP Railroad, are described in Section 1.1 and the NGS O&M Plan (SRP 2017d).

The KM is southwest of the town of Kayenta, in northern Navajo County, Arizona, on lands leased from the Nation and the Hopi Tribe. The coal conveyor is located on tribal trust land within the Nation's Kayenta Chapter. The KM administrative center is located about 18 road miles from the community of Forest Lake, within the Forest Lake Chapter of the Nation. The towns of Kayenta and Shonto, Arizona, take approximately the same travel time to reach as the community of Forest Lake due to road conditions. There are 114 residences, 6 proposed residences, and 37 vacated residences located within the KM leasehold boundary (OSMRE 2017).

The communities close to the NGS and the KM, their populations, and the one-way highway travel distances between the two facilities are shown in Table 45 (USCB 2010).

Fifty-one percent of enrolled Hopi tribal members and 58 percent of enrolled Nation tribal members live on their respective tribal trust lands (Hopi Tuteveni 2015; Nation 2014a). Many Navajos live in cities or towns on the borders of the Navajo Tribal Trust Lands and regional urban centers, such as Flagstaff, Page, Winslow, and Holbrook, Arizona; Farmington, Gallup, Bloomfield, Grants, and Aztec, New Mexico; Cortez and Durango, Colorado; and Blanding, Utah (USCB 2010).

Although the Nation has experienced an overall increase in population over the past 35 years, slight declines in population occurred during the last 15 years. The Hopi Reservation has experienced growth during the same period, with a slight population decline between 1990 and 2000. Northeastern Arizona counties experienced population growth over the same period, although at a lower rate in the past 15 years and compared to Arizona as a whole (Table 46).

Pursuit of education, employment, and lack of available housing on Navajo Tribal Trust Lands are among the factors cited for emigration from the reservations (Navajo Housing Authority 2011). Navajo and Hopi cultures and traditions draw many of those living off-reservation back for religious, ceremonial, and family gatherings. Often those living outside the Nation and Hopi Reservation provide economic support for their extended families living on the reservations (Hardeen 2015; SRP 2015).

Table 46. Population on Navajo and Hopi Reservations, in Northern Arizona Counties, and in Arizona, 2000 and 2010.

Geographic Area	Population					% Change		
	1980	1990	2000	2010	2015+	Average Annual	1980-2015	2000-2015
Navajo Nation*	104,517	143,507	180,462	173,667	173,822	1.1	39.9	-3.8
Hopi Reservation	6,906	7,215	6,946	7,185	8,140	0.4	15.2	14.7
Coconino County**	75,008	96,591	116,320	134,421	136,701	1.3	45.1	14.9
Navajo County**	67,629	77,658	97,470	107,449	107,656	1.1	37.2	9.5
Apache County**	52,108	61,591	69,423	71,518	72,124	0.8	27.8	3.7
Three-County Total	194,745	235,840	283,213	313,388	316,481	1.1	38.5	10.5
Arizona	2,718,425	3,665,228	5,130,632	6,392,017	6,641,928	1.7	59.1	22.8

* These counts include the population of the portions of the Nation in Utah and New Mexico.
** These counts include the population residing on the relevant portions of both Navajo Tribal Trust Lands and the Hopi Reservation.
+ Population estimate is based on data from 2012 to 2015 from the American Community Survey.
Source: USCB 1980, 1990, 2000, 2010, 2015.

The majority of employees at the NGS live in Page and within the LeChee and Kaibeto Chapters of the Nation (SRP 2014). Over 80 percent of the KM workforce lives in the Kayenta, Pinon, Kaibeto, Shonto, Tuba City, or Chinle Chapters. Approximately 20 percent of the KM workforce lives in New Mexico, Flagstaff, Phoenix, or elsewhere in Arizona. Overall these tribal communities have experienced declining population (Table 47). The closure of the former Black Mesa Mine may be a contributing factor to those declines (Navajo Housing Authority 2011). There may be some migration among chapters in the area. The Hopi Reservation experienced population growth, but declines occurred in several of the individual Hopi districts.

Table 47. Population of the NGS and KM Socioeconomic Study Area, 2000 and 2010.

Geographic Area	Population		% Change	
	2000	2010	2000-2010	Average Annual
Black Mesa Chapter	398	428	30	0.7
Chilchinbeto Chapter	1,325	1,165	(160)	-1.3
Chinle Chapter	8,756	8,005	(751)	-0.9
Coppermine Chapter	673	590	(83)	-1.3
Forest Lake Chapter	573	471	(102)	-1.9
Inscription House Chapter	1,214	1,252	38	0.3
Kaibeto Chapter	1,970	1,963	(7)	0.0
Kayenta Chapter	6,315	6,211	(104)	-0.2
LeChee Chapter	1,890	1,660	(230)	-1.3
Pinon Chapter	3,066	2,751	(315)	-1.1
Shonto Chapter	2,419	2,124	(295)	-1.3
Tonalea Chapter	2,537	2,452	(85)	-0.3
Tuba City Chapter	8,736	9,265	529	0.6
Hopi Reservation	6,906	7,185	239	0.3
City of Page	6,809	7,247	438	0.6
Total	53,587	52,769	(818)	-0.2

Source: USCB 2000, 2010.

Arizona's population is expected to increase by between 13 and 20 percent between 2010 and 2020 (Arizona Department of Administration 2012a.). The population projections for northeastern Arizona indicate slower growth than those for the state, between 5 and 8 percent. Coconino County is projected to have greater growth than the other counties; however, Page and the portions of the Nation and Hopi Tribe

located within the Coconino County borders will likely experience slower population growth than Flagstaff and Sedona (Arizona Department of Administration 2012b). Population densities are 2.8 and 6.4 persons per square mile on the Hopi Reservation and Nation, respectively. Population density for Arizona as a whole was 56.35 persons per square mile (USCB 2010).

The Hopi and Nation populations are younger and average household sizes are larger than those in Arizona and the U.S. The proportions of households with three or more generations living together and with those with persons 65 years and over also are higher on the Nation and Hopi Reservation than in the state and U.S. (USCB 2010). This is an indicator both of the strong family structures emphasized in Navajo and Hopi traditions and of economic dependence among extended family members.

Minority Race Environmental Justice Populations

Native Americans (referred to as American Indians by the Census Bureau, so that term is used throughout this section) are the single largest population group in northeastern Arizona (Table 48). The Coconino and Navajo County racial and ethnic minority populations include the Navajo and Hopi within the counties. Page, Navajo County, Coconino County, and Apache County all have lower proportions of American Indian residents than on Navajo Tribal Trust Lands and the Hopi Reservation, but a substantially higher proportion than Arizona and the U.S. The vast majority of these minority populations are Navajo or Hopi. Northeastern Arizona's minority race population proportion is sufficient to be considered an environmental justice population.

Table 48. Minority Race Populations within Northeastern Arizona.

Geographic Area	% Race			% Ethnicity
	American Indian	White (Alone)	Other Race(s)	Hispanic or Latino
Hopi Reservation	96.2	2.8	1.0	1.9
Navajo Nation	97.1	2.3	0.6	2.0
Coconino County	28.9	61.7	9.4	13.5
Apache County	74.5	23.3	2.2	5.8
Navajo County	44.9	49.3	5.8	10.8
City of Page	37.9	57.6	4.5	7.3
State of Arizona	5.5	73.0	21.5	29.6
U.S.	1.7	72.4	25.9	16.3

Source: USCB 2010.

3.15.3.1.2 Economic Characteristics

This section summarizes labor market conditions and other economic characteristics in northeastern Arizona and on Navajo Tribal Trust Lands and the Hopi Reservation, with respect to the economic contributions of the NGS and the KM to the regional economy.

Employment and Income

Unemployment in the study area is higher and workforce participation is lower than in Arizona as a whole except in Coconino County, which has similar rates to the state (Table 49) (USCB 2014). Local estimates of unemployment are much higher (e.g., above 50 percent) on the Nation (Navajo Housing Authority 2011).

Table 49. Labor Force Participation, Employment, and Unemployment, 2009 to 2013.

Geographic Area	% Labor Force Participation	Civilian Labor Force	Unemployed	% Unemployed
Navajo Nation	44.2	55,437	11,988	21.6
Hopi Reservation	54.0	3,086	522	16.9
Apache County	44.5	23,447	4,853	26.1
Coconino County	66.0	70,788	6,348	9.0
Navajo County	50.6	40,239	7,828	19.5
State of Arizona	60.6	3,038,226	316,360	10.4

*These population counts include the population residing on the relevant portions of both the Nation and Hopi Reservation.
Source: USCB 2014.

Employment and Income in Northeastern Arizona

More than half of the jobs and personal income in northeastern Arizona are based in Coconino County (Table 49 and Table 50). The area experienced overall job growth between 2000 and 2013, with slight losses between 2007 and 2011. Job losses can be attributed in part to closure of the former Mohave Generating Station, Black Mesa Mine, and Black Mesa Pipeline Company, as well as to the 2008 recession (U.S. Bureau of Economic Analysis [BEA] 2014a).

Table 50. Personal Income in Northeastern Arizona, 2013.

Geographic Area	Total Personal Income ($ Billions)	% State Personal Income	Per Capita Income	% State Per Capita Income
Apache County	$1.9	0.8	$26,331	71
Coconino County	$4.9	2.0	$35,933	97
Navajo County	$2.9	1.2	$26,739	72
Total Regional	$9.7	4.0	$29,668	80
Arizona	$245.1	100	$36,983	100

Source: BEA 2014a.

Important economic sectors include retail trade, health care and social assistance, federal and local government jobs, and accommodation and food services. Construction is an important economic sector in Navajo County, and farm jobs and federal government employment are important in Apache County (BEA 2014c). Nearby cities and towns, including Page and Flagstaff (outside of the Nation and Hopi Reservation), Tuba City (Nation and Hopi Reservation), Kayenta and Chinle (Nation), and Moenkopi (Hopi Reservation), provide tourist services and accommodations. Gas stations, trading posts, and convenience stores are located throughout the area. Grand Canyon National Park, Lake Powell National Recreation Area, Antelope Canyon Tribal Park, Monument Valley, the Kayenta-Monument Valley Scenic Road, Navajo National Monument, Canyon de Chelly and Wupatki National Monuments, the Hopi Cultural Center (Second Mesa), and Navajo Nation Museum (Window Rock) are all located within the region (see Section 3.12, Land Use and Recreation).

In 2013, residents of the three counties accounted for about 4 percent of the statewide total personal income (Table 50). Apache and Navajo Counties and the non-urban parts of Coconino County have income levels below Arizona's. The average annual payroll expense per employee for the NGS and PWCC ($145,000 and $138,000 per year, respectively) are approximately four to six times the corresponding per capita incomes within the northeastern Arizona counties (Table 51). The average NGS and KM employee's income is approximately 400 percent of Arizona's average per capita income, and 500 percent of the northeastern Arizona regional per capita income.

Table 51. Personal Income by Source in Northeastern Arizona, 2013.

Geographic Area	% Farm Income	% Non-Farm Income	% of Total Non-Farm Income by Source			
			Private Employment	Government Employment	Investments and Rent	Benefits and Social Security *
Apache County	66	44	17	27	14	42
Coconino County	37	63	42	21	18	19
Navajo County	55	45	28	17	16	39
State of Arizona	38	62	51	11	18	20

* Includes retirement and disability insurance, medical benefits, income maintenance, unemployment insurance compensation, veterans' benefits, and federal education and training assistance received from the government (BEA 2014b).
Source: BEA 2014b.

Earned wages from employment accounted for less than half of the income in Apache and Navajo Counties. Earnings in Coconino County are comparable to those in the state (Table 51). The relatively affluent communities of Flagstaff and Sedona may compensate for areas of Coconino County where employment is low. Northeastern Arizonans depend more on government income than Arizonans as a whole. Government assistance and social security are substantial sources of personal income in Apache and Navajo Counties compared to Arizona (BEA 2014b). Government jobs account for a greater proportion of personal income in each county compared to Arizona (BEA 2014b).

Employment and Income of the Nation and Hopi Tribe

Public Sector

The tribal governments are the largest employers on their respective lands. The Nation directly employs almost 5,000 people, and the Hopi tribal government employs nearly 500 people (Navajo Division of Human Resources 2015; Hopi Tribe 2016). Many of these jobs are based in Window Rock and Fort Defiance (Nation), and Kykotsmovi (Hopi Tribe).

More than 2,100 people work at over 60 primary and secondary schools that operate on the Nation and Hopi Reservation and in Page, including schools operated by the Bureau of Indian Education, the Navajo Department of Dine Education, and school districts serving the northern portions of Apache, Navajo, and Coconino Counties (Navajo Nation 2015a; U.S. Bureau of Indian Education 2015).

The BIA provides services to tribes and tribal members directly or through contracts, grants, or compacts. Major BIA programs are Natural Resources, Safety, Roads/Transportation, Real Estate Services, and Regional Fire Management. The Navajo Region in Gallup, New Mexico, provides services to the Nation; and the Western Region in Phoenix, Arizona, provides services to the Hopi Tribe.

Tribal Enterprises

Tribal enterprise operations include organizations owned and operated by the tribes, with the express objective of providing services or engaging in activities outside the umbrella of tribal government. In 2007, about 1,500 jobs were reported at four of the largest tribal enterprises (Navajo Nation Division of Economic Development 2010). Recent employment numbers are not available, but the Nation now charters fourteen enterprise activities, three of which are described below. Enterprise activities for the Hopi Tribe include a ranching enterprise and a real estate enterprise.

The Navajo Tribal Utility Authority (NTUA) supplies electricity, water, natural gas, wastewater treatment, and solar power to 40,000 residents, tribal government, and other commercial and industrial customers. NTUA has a staff of about 620 regular and temporary employees, 605 of whom are Navajo (NTUA 2015).

The Navajo Agricultural Products Industry (NAPI), with operations concentrated in New Mexico, produces potatoes, corn, alfalfa, beans, and small grains that are marketed under the brand Navajo Pride

(NAPI 2015). Navajo Beef, another of the Nation's brands, is now served at several Nation casinos. The Hopi Three Canyon Ranches program includes five working ranches located on ancestral lands south of the Hopi Reservation (Gashwazra 2015). The ranches provide training opportunities for Hopi youth to sustain the important role of agriculture in Hopi culture and to establish and market a premium brand of beef.

The Navajo Nation Gaming Enterprise operates four casinos in New Mexico and east of Flagstaff and is permitted to operate an additional three casinos (Navajo Gaming 2015). The Hopi have twice defeated measures to approve gaming (Gashwazra 2015).

Farming and Ranching
Farming and ranching are major parts of the economic landscape and cultural heritage for the Navajo and Hopi (see Section 3.12, Land Use and Recreation). Livestock, corn, and vegetables are essential subsistence commodities, important for maintenance of cultural traditions, and a source of cash income or a commodity for barter and exchange. In 2012, about 14,500 farms were located on Navajo Tribal Trust Lands, and 350 were on the Hopi Reservation. Farming is the second largest employment sector in Apache County (Table 51). About half of these farms reported combined sales of approximately $31.9 million, while the other half reported no sales for cash, or sales of less than $1,000 (USDA/NASS 2014a, 2014b).

Energy and Mineral Development
The BIA is responsible for management of Indian trust assets, including surface and subsurface minerals. BIA's Division of Real Estate Services has historically been responsible for ensuring that Indian trust assets and lands are protected, managed, developed, and utilized. The Navajo Nation General Leasing Regulations Act of 2013 extends Nation leasing authority to all tribal surface lands without the approval of the Secretary of the Interior. Federal approval is required for mineral and ROW leases (Nation 2014c, see below). Regarding activities at the NGS after the expiration of the Existing Lease, parties have stipulated that the issuance of a new lease with the Nation would require approval by the Secretary of the Interior pursuant to 25 USC Section 415(a) (see Chapter 1, Purpose and Need).

Coal and natural gas reserve development have been important direct and indirect economic drivers, employment sectors, and sources of revenue that support tribal government operations. The KM and the former Black Mesa Mine are both located on Nation and Hopi Reservation lands (see Section 3.12, Land Use and Recreation). In addition to the KM and former Black Mesa Mine, the Nation owns the Navajo Mine, which provides coal to the FCPP in New Mexico.

Major energy-related generation and transmission infrastructure are part of the Nation's economy. Other facilities located on the Nation include the Four Corners Power Plant and San Juan Generating Station in New Mexico and multiple electrical transmission lines and natural gas pipelines. The Coronado and Springerville power plants in Apache County and the Cholla Power Plant in Navajo County are located close to the Nation.

Low-Income Environmental Justice Populations

Poverty rates for the Nation and Hopi Reservation are substantially higher than in Arizona (Table 52). Poverty rates for the Nation, the Hopi Reservation, and the three northeastern Arizona counties are all sufficiently higher than rates in Arizona and the U.S. to warrant being considered low-income environmental justice populations.

High unemployment, low labor force participation, greater income disparity, and factors such as reliance on seasonal and part-time work are reflected in median household incomes (MHI) that are below the statewide and national levels. The Nation and the Hopi populations both have higher than average dependency on public assistance than the Arizona and U.S. populations (Table 53).

Table 52. Income and Poverty in Northeastern Arizona.

Geographic Area	Median Household Income (MHI)	% Household Income Less than $25,000/year	% Families Below Poverty Level	% Individuals Below Poverty Level
Navajo Nation	$26,203	48.3	37.5	41.7
Hopi Reservation	$37,754	36.2	29.4	31.3
Apache County	$31,757	34.6	29.6	36.6
Coconino County	$50,234	18.5	15.5	22.7
Navajo County	$35,921	30.7	25.1	30.6
State of Arizona	$50,255	24.0	13.3	18.2
United States	$53,898	23.1	11.3	15.5

Source: USCB 2015.

Table 53. Income Source Characteristics in Northeastern Arizona.

Geographic Area	% Households Reporting Income from the Following Sources*				
	Earnings	Retirement	Social Security	Food Stamp Benefits	Supplemental Public Assistance
Navajo Nation	79.9	14.9	28.8	31.4	24.8
Hope Reservation	64.0	27.5	28.2	41.3	10.4
Apache County	61.1	19.4	34.8	26.8	22.9
Coconino County	82.3	17.3	24.4	14.1	6.1
Navajo County	37.6	22.0	37.6	26.4	13.2
State of Arizona	74.8	19.9	32.0	13.5	6.5
U.S.	77.8	18.1	29.8	13.2	8.2

* The sum of these three columns can exceed 100 percent due to households receiving more than one form of income.
Source: USCB 2015.

The economic effects of NGS retirement and KM closure will be experienced acutely by the environmental justice populations within the chapters and communities where employees live and on the Nation and Hopi Reservation, where revenues from the facilities fund government and social services.

3.15.3.1.3 Economic Importance of the NGS and the KM

Nation and Hopi Tribe

The NGS and the KM are among the largest employers and economic contributors to the Nation and the Hopi Tribe (Shelly 2011; Shingoitewa 2010; Honanie 2014). The tribes benefit from employment from the NGS and the KM, and the associated lease and royalty payments (see discussion below, Etsitty 2014, and Honanie 2014). The direct, indirect, and induced employment and economic benefits from the NGS and the KM increase the standard of living on the Nation and Hopi Reservation. Many NGS and KM employees support extended families (see discussion below). These jobs allow many Navajo and Hopi workers to remain on or near the reservations, where cultural and familial ties are important (Arizona Rural Policy Institute 2012; Black Mesa United, Inc. 2005).

The NGS and the KM provide high-paying full-time direct employment to about 1,164 workers, including contractors. Navajo or Hopi account for over 800 of these workers (SRP 2015). Support services and supplies for the NGS and the KM generate indirect jobs and economic benefits. Spending on goods and services by those directly and indirectly employed generates induced jobs and economic benefits on the Nation and Hopi Reservation and in nearby communities. Revenues to the Nation and Hopi Tribe, indirect employment, and induced employment associated with the NGS and the KM support about 2,610 jobs per year, including about 562 tribal jobs.

NGS and KM employees reside mainly in the northwest part of the Nation and in nearby Page (Table 55 and Table 57). Consequently, the direct economic effects of the two facilities' employment are fairly localized. Because lease payments, royalties, taxes, and other revenues support a substantial number tribal jobs, programs, and services, the indirect and induced socioeconomic effects of the two facilities are experienced throughout both reservations.

Coconino and Navajo Counties and the City of Page

The NGS and the KM provide substantial employment opportunities, direct and indirect economic contributions, and revenues to Coconino and Navajo Counties. Because of its year-round operations, the NGS provides a counterbalance to Page's seasonal tourism and outdoor recreation economy. As a regional trade center, NGS and KM employees and contractors purchase goods and services in Page. NGS workers hold political office (five Page mayors have been NGS employees) and serve on boards and committees. Spouses of NGS workers hold jobs in local government, schools, and businesses. The NGS and its employees donate funds and volunteer time to local charitable and civic initiatives (Diak 2015; SRP 2014).

The communities of Kayenta, Tuba City, Flagstaff, Winslow, and Prescott also benefit from NGS and KM employment, direct and indirect economic contributions, and revenues. NGS in lieu, property tax, and voluntary payments are important for Coconino County, the Page Unified School District, and local special purpose and service districts. The KM has an important economic presence in Navajo County and the Kayenta community (see below).

Economic Contributions of the NGS

Operations and Employment

The NGS provides well-paying jobs, revenue, and direct and indirect economic benefits in northeastern Arizona and on the Nation. Between 2010 and 2013, the total annual expense for the NGS averaged about $448 million. Major capital expenditures vary from year to year. Purchase of fuel (which is primarily for coal but also includes electricity, fuel oil, and motor vehicle fuel) is the single largest expense, averaging $287.7 million. Approximately 23.5 gigawatt hours (about 0.13 percent of the power generated at the NGS annually) is used to operate the BM&LP Railroad (SRP 2014). Power is purchased by NTUA from the NGS and then marked up for delivery and sold to SRP for railroad use; SRP payments for power to operate the railroad are estimated to average $340,000 per year.

Labor is the NGS's second largest expense. A total of 495 workers were employed in 2014, and up to 520 workers have been employed. Most workers are members of the International Brotherhood of Electrical Workers. The payroll expense in fiscal year 2014 was $71.8 million, including $52.4 million in wages, salaries, sick leave, holiday, and vacation compensation; and $19.4 million in Federal Insurance Contributions Act, retirement, and other benefits. The total average payroll and benefits cost per employee is nearly $145,000 per year (SRP 2014).

All of SRP's regular employees at the NGS are salaried or hourly, full-time, and eligible for SRP's comprehensive benefits package. Among the workforce, about 40 percent have been with SRP for 20 years or more, and over 60 percent have been with SRP for over 6 years. Approximately 18 positions are vacated and filled annually (SRP 2014). Benefits include retirement payments to former employees and the future payments to current employees; ongoing training in specialized courses to support career advancement; and introductory training for members of the community to obtain related job qualifications.

In 2015, 86 percent of the NGS workforce was American Indian, including 65 percent of all managerial and supervisory staff across all departments (Table 54). Under terms of the Existing Lease, qualified Navajo are given preference for available jobs. Nearly two-thirds of NGS employees live in Page, and

more than a quarter live on the Nation. Seventy-five percent live within 50 miles of the NGS, while 10 percent reside in more distant parts of the Nation and other regions of Arizona (Table 55) (SRP 2014).

Table 54. Managerial and Non-managerial Positions at the NGS Held by Native Americans, 2015.

Job Category	% Positions Held by American Indians
Managerial/Supervisory	65
Non-managerial	90
Total	86

Source: SRP 2015.

Table 55. Place of Residence for NGS Employees, 4th Quarter 2014.

Community/Chapter	Number	Percent	Community/Chapter	Number	Percent
Page	294	59	Phoenix Metro Area	10	2
LeChee	50	10	Flagstaff and Nearby	5	1
Kaibeto	30	6	Arizona – Elsewhere	33	7
Tuba City	21	4	Utah – All	9	2
Red Lake	14	3	New Mexico – All	6	1
Kayenta	11	2	Elsewhere	1	0
Shonto	11	2	**TOTAL**	**495**	**100**

Source: SRP 2014.

NGS contractors for hauling waste and for security services account for another 38 jobs on-site. An unspecified number of jobs are created through regular purchases and deliveries of materials and supplies from vendors.

Annual O&M at the NGS averaged over $88 million per year. This includes the cost of the scheduled annual overhauls at the plant. Each overhaul employs between 800 and 1,200 contractors and NGS-employed temporary workers. Contractor services and payroll payments generated by overhauls range between approximately $9.5 million and $24.4 million depending on the extent of the overhaul. With additional outlays for equipment, machinery rentals, materials, and other expenses, the total expenditure per overhauls ranges between $19.8 million and $46.0 million (SRP 2014, 2015). These maintenance activities provide important recurrent jobs and income to the Page, Nation, and regional economies (Diak 2015; Hardeen 2015).

San Antonio, Texas-based Zachry Construction has been the prime contractor for the annual maintenance overhauls for more than 25 years, employing many local workers who return year after year. The overhaul contracts incorporate a preference clause for hiring qualified Navajo workers. The maintenance shutdowns are scheduled for February and March as required in the NGS Air Permit, and they coincide with lower seasonal electrical system demand and the off-season for Page tourism, filling otherwise vacant lodging and generating retail, dining, and fuel sales and the associated taxes. The wages earned during these overhaul activities are an important source of earned income for local contractors and temporary NGS employees; and the income commonly provides vital support for extended families on the Nation.

Royalties and Contributions

Property taxes from the NGS and use taxes on major purchases from outside Arizona are the two major categories of taxes paid directly to the tribal, local, and state governments. As a federal agency, Reclamation is exempt from paying state, local, and tribal property, sales, and use taxes associated with the U.S. share in the NGS. As a political subdivision of Arizona, SRP is exempt from property taxes but makes contributions in lieu of property taxes as outlined in Arizona Revised Statutes 48:241-248 (AZ Rev. Stat 2015).

The non-federal NGS Participants pay taxes and in lieu of tax payments to the Nation equal to 50 percent of their annual tax payments to local taxing authorities. The annual combined in lieu, property tax, and payments to all parties is approximately $8.0 million, of which about $2.7 million goes to the Nation. These payments support the Navajo tribal government, local governments and other taxing districts, and public education. The remaining $5.3 million accrues to the local school district, the state education equalization fund, Coconino County, and local special purpose and service districts. These revenues support payrolls, service provision, and infrastructure. Under the terms of the Existing Lease, an annual NGS lease payment of $608,400 is made to the Nation. The NGS and employees at the NGS provide approximately $325,000 in educational scholarships and contributions to community service groups and programs (Navajo Nation et al. 1969; SRP 2014).

As part of a renegotiated coal lease with the Hopi, the NGS and PWCC make an annual Generation Performance Payment to the Hopi. In 2015, the payment totaled $1.365 million. Those funds were designated by the Hopi Tribal Council for deposit into the Hopi Educational Endowment fund. The fund provides financial assistance to Hopi students pursuing higher education goals (Hopi Tuteveni 2015).

Economic Contributions of the KM

Operations and Employment

The KM is the second largest industrial facility operating in northeastern Arizona. PWCC operates the mine under a “cost plus” contract with SRP, providing a negotiated margin above the cost of production. Outlays for labor, royalties, subcontractors, utilities, and local taxes totaled more than $160 million in fiscal year 2014, representing a large portion of overall production costs (PWCC 2014).

The KM employed 440 workers in 2014, the majority of whom are full-time salaried or hourly wage status and eligible for comprehensive benefits packages (PWCC 2014). Most KM employees are represented by the United Mine Workers of America Local 1924, which has a 6-year contract with PWCC set to expire in September 2019.

Among the workforce, 69 percent had more than 20 years of tenure, 9 percent had 6 to 20 years tenure, and the remaining 22 percent had been at the facility 5 years or less (PWCC 2014). PWCC fills approximately 5 positions annually in response to retirement, termination for cause, or voluntary departure by an employee. Ninety-six percent of the mine’s workforce is American Indian, including 77 percent of the managerial and supervisory staff (Table 56). Qualified Native Americans receive hiring preference for available jobs.

Table 56. Managerial and Non-managerial Positions at the KM Held by Native Americans, 2015.

Job Category	Share of All Such Positions Held by Native Americans (percent)
Managerial/Supervisory	77
Non-managerial	99
Total	96

Source: PWCC 2015d.

The KM’s $60.8 million payroll expense in fiscal year 2014 included $34.6 million in wages and salaries and $26.2 million in retirement and fringe benefits such as sick leave, holiday, and vacation compensation. The total average payroll and benefits per employee is nearly $138,000 per year (PWCC 2014). PWCC pays retirement benefits to 478 former employees and future payments to current employees based on service at the KM and former Black Mesa Mine. Of the nearly 500 paid retirees, 80 percent reside in Arizona, and 37 percent reside in Kayenta (PWCC 2015e; OSMRE 2017).

Over half of the KM’s current employees live in Kayenta, and 75 percent reside within a 75-mile radius of the mine (Table 57). The majority of workers live on the Nation in surrounding chapters. Seven percent of the mine’s workforce commute from New Mexico or Utah.

Table 57. Place of Residence for KM Employees, 2014.

Community/Chapter	Number	Percent	Community/Chapter	Number	Percent
Kayenta	235	53	Ganado	3	1
Tuba City	25	6	Many Farms	3	1
Shonto	23	5	Dennehotso	2	0
Pinon	19	4	Kykotsmovi	2	0
Flagstaff and Nearby	17	4	Cameron	1	0
Page	12	3	Elsewhere in Arizona	47	11
Chinle	10	2	New Mexico – All	20	5
Kaibeto	10	2	Utah – All	7	2
Teec Nos Pos	4	1	**Total**	**440**	**100**

Source: PWCC 2014.

Sixteen contractors and vendors, employing an additional 79 workers at the KM site, hold long-term contracts to provide maintenance, reclamation, and security services at the mine. In 2013, those contracts had a combined value of $11.6 million.

Royalties and Contributions

Royalties paid to the tribes by PWCC averaged $40.6 million a year between 2011 and 2013. On average, 67 percent of payments go to the Nation and 33 percent to the Hopi Tribe. PWCC makes annual bonus payments to both tribes, which are established by contract and based on annual production. Annual average coal bonus payments from 2005 to 2014 were $7.5 million (PWCC 2015f). In 2013, PWCC reported payments of $25.3 million in other taxes and fees. The total includes local property taxes paid to Navajo County and other local taxing jurisdictions and transactions privilege tax (TPT, also known as sales tax) (OSMRE 2017).

In 2014, PWCC provided $435,000 in educational scholarships and more than $900,000 in donations to community activities and programs. Employees of the mine made additional monetary contributions and also volunteered time to various causes and programs.

PWCC's lease agreements with the Nation and Hopi Tribe provide for the use of groundwater. While the specific financial terms of the agreements are confidential, fees are paid monthly and are subject to increases over time. Over the past 5 years, PWCC paid an average of $1.3 million in water fees per year, based on average annual use of 1,400 acre-feet. An increase in water fees, retroactive to 2015, is pending approval by the Hopi Tribal Council and the Secretary of the Interior. The closure of the Black Mesa Mine and Black Mesa coal-slurry pipeline in 2005 resulted in substantial reductions in water use and water fee revenue. PWCC payments to NTUA for electrical power to operate the mine average $9.9 million per year (OSMRE 2017).

PWCC makes payments into the federal Abandoned Mine Land Reclamation and the Black Lung Disability Benefit programs. Payments into these programs are based on production at the KM and rates established by Congress. Coal producer payments into the Black Lung Disability Trust Fund are the lower of $0.55 per ton or 4.4 percent of the sales price. Assuming the $0.55 per ton rate applies to the KM, PWCC's annual payments in the fund would be $4.56 million, based on maximum annual production of 8.1 million tons (Internal Revenue Service 2005).

The Abandoned Mine Land Fund was established under SMCRA, and most of the reclamation fees collected return to states and tribes in the form of grants to fund Abandoned Mine Land Reclamation projects. PWCC's annual payments into the Abandoned Mine Land Fund are about $2.55 million based on maximum annual production of about 8.1 million tons at the KM. The Nation was awarded $30.1 million in Abandoned Mine Land grants during the 4-year period 2011 through 2014. Awards to the Hopi Tribe during that period totaled $4.1 million (OSMRE 2015a, 2015b).

Nation Revenues and Expenditures

For fiscal year 2014, the Nation recorded total revenues of $883.25 million and total expenses of $565.43 million. Operating and capital grants and contributions, the majority of which come from the federal government and are earmarked for use in specific programs, accounted for more than 36 percent of the revenue. Included in those totals were net general fund revenues of $231.9 million and current year expenses of $208.0 million (Nation 2014b). The difference is accounted for by transfers to other funds, changes in fund balances, and year-end encumbrances. The general fund revenues allow the Nation to exercise its sovereignty (Nation 2015).

Tax revenues, including sales and possessory interest taxes, the latter akin to a property tax, accounted for 10 percent of total revenues. Mining-related revenues, including royalties and bonus payments derived from the KM and from the Navajo Mine in New Mexico, totaled 27.5 percent of the total revenues. About 7 percent of revenues come from oil and gas production. Lease, rental, and other revenues derived from land, buildings, and ROWs accounted for 7 percent of revenues. ROWs leases for oil and gas pipelines have accounted for substantial increases in lease revenues in recent years (Nation 2014b).

Expenditures for general government, including the operations of the executive, legislative, and judicial functions, totaled 41 percent of the 2013 total general fund expenditures (Figure 20). These functions include the overall administration and management for the Nation. Community and rural development, natural resources, and education and training are the other major functions accounting for more than $20 million in total expenditures (Nation 2014b). The expenditures shown in Figure 20 do not include the budgets for the NTUA, NAPI, Navajo Nation Hospitality Enterprise, Navajo Housing Authority (NHA), and other enterprise activities that are legally separate from but financially accountable to the Nation. Budget data for these enterprise activities are not publicly available.

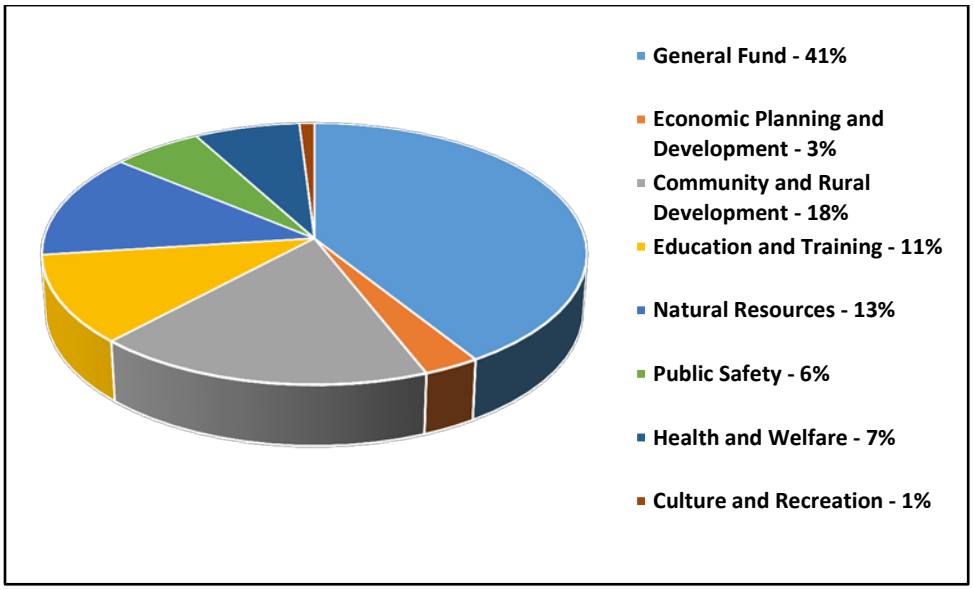

Figure 20. Percentage Distribution of General Fund Expenditures by the Nation, 2013.

Hopi Tribe Revenues and Expenditures

In 2005 and 2006, mining-related revenues derived from the combined operations of the KM and former Black Mesa Mine and Black Mesa coal-slurry pipeline were reported to account for 50 to 55 percent of the Hopi general operating budget. In 2010, following reductions in budgetary adjustments associated with the closure of the Black Mesa Mine and Black Mesa coal-slurry pipeline, the Hopi reported that mining-related revenues represented approximately 88 percent of the tribe's annual budget (Hopi 2010).

Although the specific percentage value may vary year to year, the tribe remains dependent on revenues related to operation of the mine.

The Hopi Tribal Council approved a 2015 General Fund budget of $23.49 million, out of which comes funding for each of the villages; the legislative, executive, and judicial branches; and other operating departments and offices. Details regarding the sources of revenue are not available; however, the royalty and bonus revenue derived from operations of the KM are the single major source of general fund revenues. Other sources of revenues include grants, investment earnings, and revenues from business licenses, charges for services, reserves, other miscellaneous revenues, and transfers from the Hopi Tribe's enterprise activities.

3.15.3.1.4 Sociocultural Conditions

This section describes recent and current relevant sociocultural conditions and trends in northeastern Arizona and on the Nation and Hopi Reservation. Sociocultural conditions are anticipated to remain relatively unchanged until the NGS is retired, the timing of which depends on the selection of an alternative. Because the NGS and the KM have both been part of the socioeconomic environment for over 40 years, their operations and the related effects are considered part of the affected environment.

Sociocultural Context

Both the Nation's and Hopi's sociocultural context is shaped by traditional cultural beliefs and values; a long and complicated history of interactions with each other, the federal government, and outside parties; and the social and economic environment. Poverty, limited employment opportunities, high unemployment, housing shortages, and lack of infrastructure are present on the reservations at higher rates than in Arizona or the surrounding areas (see Table 50, Table 51, Table 52, and Table 53).

Sociocultural trends of the Nation and the Hopi Tribe over the past century include changes to the availability of housing, education, social services, and infrastructure. Contributing factors to social change include population growth, emigration to off-reservation locations, an increasing reliance on wage and salary employment, changes to education systems, historic and current land-use policies, and the development of tribal governments (Hopi Office of Community Planning and Economic Development 2001; Lyon 2003).

Today, members of the Nation and Hopi Tribe may work in contemporary occupations both on- and off-reservation while maintaining their culture, customs, and traditional lifestyles (Black Mesa United, Inc. 2005; Hopi Office of Community Planning and Economic Development 2001). Ranching and farming are also important economic and cultural activities (see above and Section 3.12, Land Use and Recreation).

There is a continuum of opinions regarding traditional values and mining and electrical power generation among some Navajo and Hopi. Some Navajo and Hopi believe that mining and burning coal for electric power generation is not compatible with their respective traditional values. Others believe such activities can be compatible and also merit consideration because of economic benefits (Thompson 2017a and 2017b; Sherry 2002).

Housing Characteristics

Housing availability, affordability, and conditions are indicators of socioeconomic conditions (Table 58). Despite high reported vacancy rates, housing need is high on both the Nation and the Hopi Reservation as many of the vacant homes are substandard. Home ownership rates in the region are equal to or higher than in Arizona as a whole, and mobile homes are more common. Neither the Navajo nor the Hopi practice private land ownership. More than 8,000 rentals and home ownership units are managed by the NHA. Many Navajo live in traditional one-room dwellings called hogans.

Table 58. Housing Occupancy and Vacancy, 2010.

Geographic Area	Total Housing Units	Number of Occupied Units	% Owner-Occupied Units	Number of Vacant Units	% Vacant	% Mobile Homes
Navajo Nation	68,945	43,623	63.3	25,322	36.7	19.8
Hopi Reservation	2,782	1,991	74.6	791	28.4	16.4
Arizona	2,859,768	2,370,289	64.4	489,479	17.1	10.7

Source: USCB 2010.

A disproportionate number of occupied homes on both the Nation and Hopi Reservation do not have access to a motor vehicle or do not have complete plumbing facilities, kitchen facilities, or telephone service (Table 59). The rate of homes with more than 1.5 occupants per room is substantially higher than the statewide average. Single-room homes are much more common on both reservations, particularly on Navajo Tribal Trust Lands.

Table 59. Selected Characteristics of Occupied Housing Units, 2010.

Geographic Area	% Occupant Has No Vehicle Available	% More than 1.5 Occupants per Room	% One Room	% Lack Complete Plumbing Facilities	% Lack Complete Kitchen Facilities	% No Telephone Service Available
Navajo Nation	15.2	9.6	22.7	21.4	17.1	23.2
Hopi Reservation	19.3	7.5	7.9	17.2	18.3	3.7
Arizona	6.9	1.3	2.2	0.8	0.9	3.0

Source: USCB 2010.

More than 60 percent of the occupied housing units on the Nation and the Hopi Reservation rely on wood for heating, which is 30 times the statewide average. Coal from the KM is made available to Navajo and Hopi from mid-October to mid-March for home heating (OSMRE 2011). Wood salvaged during clearing of areas to be mined also is made available to mine lease area residents free of charge. Mine lease area residents receive coal card coupons allowing them to obtain up to six pickup loads per year at no cost. Nation chapter governments also are provided coupons, which are intended for distribution to the elderly and disabled. The Hopi Tribe is provided 3,500 coupons per year, for distribution through the village governments. All others are charged a fee for coal. Some Navajo and Hopi purchase coal, repackage it, and sell it at roadside stands or markets. PWCC has distributed over 13,000 tons of coal annually in recent years. PWCC distributes a flyer regarding the safe use of coal in the home at the coal distribution site (PWCC 2015g).

Individual Nation households may construct a home on rural portions of the Nation through the acquisition of a homesite lease issued by the BIA (Nation 2015b). Obtaining a homesite lease and building or improving a structure requires concurrence with local chapter grazing boards and environmental compliance under NEPA, usually through a categorical exclusion. Within the KM, homesite leases are not currently being approved (PWCC 2015g, 2015h).

Housing on the KM Lease Area

Residents within the KM lease area receive a number of services provided by PWCC. All but five homes in the lease area have electrical service, but none have complete plumbing facilities (PWCC 2015h). Lease area residents, like those in many rural parts of the Nation, must haul water for their homes and livestock. PWCC provides two public use water stations within the lease area and hauls water to some livestock tanks and residents who are unable to haul their own water (PWCC 2015h). PWCC provides road maintenance and snow plowing to KM lease area roads.

The Manymules Water Project is planned to deliver water to approximately 60 dispersed homesites in and near the KM lease area (Black Mesa Review Board [BMRB] 2015; Nation 2011; Nation 2013). The BMRB was awarded an Abandoned Mine Land program grant to construct bathroom additions and install plumbing in homes to be served by the Manymules Water Project (BMRB 2010). This is Phase 1 of a four-phase project to provide potable water to residents in the KM Permit Area.

Relocation and Compensation

In the KM and former Black Mesa Mine area, residents are relocated if their residences fall within the required minimum separation distance between mining activities and occupied buildings. PWCC, in cooperation with the affected parties and according to tribally approved procedures, either provides a replacement home on a mutually agreed upon location, or compensates the owner with a negotiated lump sum payment for the value of all structures.

Since 1970, 27 households have been relocated and received replacement residences and improvements, and another 5 have relocated temporarily; 13 households have received compensation for their residences; and 56 have been compensated for other improvements. Four households have been compensated for inconvenience (PWCC 2015b). PWCC compensates residents for the appraised value of existing homes. Some residents who were compensated for their homes during the 1970s and 1980s have stated that the compensation was inadequate to fund construction of new homes. Some lease area residents who were relocated said that they had springs or ponds at their original locations but water was not available at their replacement homesite. Others report moving more than once due to mining activities. Other residents state that although their lands were not taken for mining, the proximity to mining activities compelled them to move.

PWCC attempts to relocate residents within their customary use areas (i.e., where grazing takes place or where sociocultural ties exist). When grazing lands are to be withdrawn for mining, PWCC coordinates with the grazing permit holder and the Navajo Tribal Trust Land Department. PWCC compensates grazing permit holders for any acreage withdrawn from a customary use area for mining (PWCC 2015h). Some residents have chosen to be relocated to other communities (PWCC 2015b, 2015h). Navajo culture is matrilineal and matrilocal, meaning property descends through females, daughters establish homes close to their mothers, and husbands come to live on their wife's lands (Lyon 2003). Family members who move away will often return to live near their families, which allows the transmittal of traditional cultural practices from one generation to the next.

Community Facilities and Social Services

Educational Attainment

Both Navajo and Hopi have lower educational attainment rates and lower high school graduation rates than Arizona's population (Table 60). Both the Nation and Hopi Tribe have scholarship and financial assistance programs to help members achieve higher and vocational education. The NGS and PWCC make annual contributions to support these programs and offer training programs to help employees advance their careers.

Table 60. Educational Attainment of Individuals 25 Years of Age and Older.

Geographic Area	Did Not Complete High School	High School or Equivalent, No College	Some College or Associate Degree	Bachelor's or Advanced Degree
Navajo Nation	30.0	33.5	28.8	7.7
Hopi Reservation	16.8	32.2	41.7	9.3
Arizona	14.3	24.5	34.3	26.9

Source: USCB 2015.

Medical and Emergency Services

The Navajo Area Indian Health Service (IHS) provides health services for Nation and Hopi Tribe members in Arizona, New Mexico, and Utah. Comprehensive health care is available at 6 hospitals and 22 health centers and clinics. IHS facilities in northeastern Arizona include a new hospital in Kayenta and the Hopi Health Care Center in Polacca (IHS 2015a, 2015b). Although NGS and KM employees have health insurance, many residents in the area do not. Most Navajo living in the area travel substantial distances to IHS clinics.

Forty trained emergency first responders work at the KM. The KM first-aid station is open 24 hours per day and staffed by certified personnel. Although the station primarily is for KM employees, it also provides emergency services. PWCC hosts an annual health fair for employees and area residents, which provides flu shots and routine screening for blood pressure, blood sugar, and blood testing for other health indicators. IHS participates in the health fair (PWCC 2015i, 2015j).

Traditional Values

Navajo Traditional Values

The official expression of Navajo traditional values is embodied in Traditional Law, Customary Law, Natural Law, and Common Law (Barber 2008). Collectively, these four laws declare the fundamental beliefs and traditional practices that must be honored and protected to ensure the continuance of the Navajo people. Among these are the responsibilities of the Diné to the universe and its resources by practicing the Diné Life Way, and the obligation of the Diné to uphold ceremonial and oral histories for the protection and preservation of the beauty, harmony, and balance of the natural world for future generations. The Diné have intimately interacted within the landscape known as Dzil Ijiin or Black Mesa, for example (Linford 2000; Wharburton and Begay 2002), as ecological stewards and ceremonial custodians since time immemorial (McPherson 2001). Historical Diné ways of interacting with the land is understood through the fundamental, natural, and sacred ceremonial laws bestowed upon the Diné since the beginning of their emergence (McPherson 1992).

Hopi Traditional Values

The Hopi value stewardship with the land rather than economic exploitation. Every living thing should be protected since all serve purpose within the Hopi worldview (Ferguson 1998). An intimate knowledge of the natural world developed from the Hopi's migration from the Grand Canyon. Of particular importance to the Hopi are springs and water sources, which emphasizes the significance of Black Mesa's water. Archaeological sites and cultural features reflect the footprints of their ancestors and validate their long history with the land and its elements (Dongoske et al. 1993). Hopi knowledge of plants and animals further validates their long history and intimacy with the land (Ferguson 1998).

Zuni Traditional Values

Although Zuni Tribal Trust Lands are not within the analysis area, the Zuni recognize ancestral lands in northeastern Arizona and the KM. Concerns expressed during scoping relate to Zuni traditional values.

The Zuni perspective of their landscape has been described as follows: "The [Zuni] view their universe as a single complete whole. All parts are equally important. Metaphorically this includes 'the four oceans, the moss covered mountains, the forests, the springs, the rivers, the lakes that surround the land.' The total landscape is their religious universe. This concept and the relationship of the people to their environment permeate the religious life and use of the land. It is important to maintain equilibrium with nature in all its parts." (Ladd 1983)

Dongoske, et al. (2015) explain that the Zuni view their relationship with the natural world as one of stewardship; they belong to and are a part of the land rather than owners of the land. Conservation of the

natural environment is approached from the perspective of caring for a relative as opposed to the western, scientific view of conserving or managing natural resources. The respect and depth of feeling the Zuni hold for the landscape is the same as they hold for their friends and families. A metaphor which has been used by the Zuni to explain this relationship is "The land is our church, our cathedral. It's like a sacred building" (Hart 1995). Dongoske, et al. (2015) further explain that "The Zunis' relationship with the environment permeates not only their religious use of the land but also their utilitarian and political use. Every kind of activity that the Zuni people carry out is associated, in some fashion, with a religious pursuit and use."

NGS- and KM-Related Sociocultural Issues

The NGS and the KM have been a part of northeastern Arizona's social and economic context for over 40 years. As part of this NEPA process, government-to-government consultations with the tribes, public scoping, and public participation have been undertaken by Reclamation and the BIA. Comments from public scoping are summarized in Appendix A. The economic importance of the NGS and the KM to northeastern Arizona, the Nation, and the Hopi Tribe is summarized above.

Concerns about the economic, cultural, environmental, and health effects of the NGS and KM operations and facilities have given rise to social and environmental activism and the formation of organizations that advocate for cultural preservation, environmental justice, and human health protection (Dine CARE 2017; Black Mesa Trust 2017; Thompson 2017). Concerns about the NGS and the KM include the potential effects of plant emissions on air quality, visibility, climate change, and human and ecological health, including effects on endangered species. There is concern that emissions and mine operations may contaminate soil, water, and food sources. The Navajo and Hopi rely on subsistence farming, livestock grazing, hunting, and gathering of traditional plants for part of their diet and for ceremonial purposes.

A common concern among KM lease area residents is the reported high incidence of respiratory disease, which they attribute to fugitive dust, coal dust, blasting emissions, coal conveyance, and smoke from indoor heating. Many households use or have used wood and coal for heating, also a potential cause of respiratory disease (see Section 3.13, Public Health and Safety). Lease area residents also are concerned about the risk of cancer from mining activities (National Renewable Energy Laboratory [NREL] 2012b).

As discussed above, relocation of residents on the KM presents cultural concerns, as Navajo have a strong relationship to their matrilineal home. Loss of cultural resources (see Section 3.14, Cultural Resources) and temporary loss of rangeland and farmland (see above and Section 3.12, Land Use and Recreation) also present sociocultural concerns to both the Navajo and Hopi.

These resources are discussed in Section 3.3, Air Quality; Section 3.6, Soils; Section 3.8, Water Resources; Section 3.9, Special Status Species; Section 3.10, Fish and Wildlife; Section 3.11, Vegetation; Section 3.12, Land Use and Recreation; and Section 3.14, Cultural Resources. Human health, agricultural, and food chain effects related to the NGS and the KM are discussed in Section 3.13, Public Health and Safety; and Section 3.12, Land Use and Recreation.

3.15.3.2 STS and WTS Transmission Systems

The STS and WTS transmission systems encompass 3,960 acres of Navajo Tribal Trust Lands (see Section 3.12, Land Use and Recreation). Together these systems provide delivery of power to the service areas of NGS owners as well as the CAP. The STS and WTS ROWs are leased from the Nation, under § 323 Grants that stipulate land use and requirements for reclamation upon decommissioning (see Section 3.12, Land Use and Recreation; and Section 1.1, Background). Lease payments to the Nation for the STS and WTS are included in the payments under the Existing Lease and also would be under the Extension Lease.

3.15.3.3 CAP—Central and Southern Arizona and Tribes

As discussed in Section 1.2, Background, the federal share of NGS power is used to meet the power requirements for operation of the 336-mile-long CAP system, a Reclamation project that delivers Colorado River water to central and southern Arizona. The decision to retire the NGS is based in part on the economic feasibility of continued purchase of power from the NGS versus from other sources (CAWCD 2017).

The CAP system originates at the Mark Wilmer pumping plant on Lake Havasu in La Paz County. Water deliveries are made to municipal and industrial (M&I) water users, agricultural users, and CAP-affected Tribes in Maricopa, Pinal, and Pima Counties, Arizona. The CAP was primarily developed to deliver water for use as agricultural irrigation water and thereby reduce demand for groundwater pumping that contributed to subsidence across the region. Higher than anticipated construction costs and population growth in central Arizona shaped the CAP into an M&I project (Reclamation 2000). The majority of water deliveries occur in the Phoenix area. Between 1985 and 2010, the combined population of Maricopa, Pinal, and Pima Counties more than doubled (BEA 2014a).

The Central Arizona Water Conservation District (CAWCD) was created to manage, operate, and maintain the CAP and provide a means to repay the federal government for the CAP's reimbursable construction costs. The CAP's annual Colorado River withdrawals average about 1.6 million AFA. An AFA of water equals approximately 326,000 gallons, enough to serve the average annual demand of three homes in the CAP service area for 1 year.

3.15.3.3.1 CAP-Affected Tribes

Water availability has been critical to that economic expansion and population growth. Seven CAP-affected Tribes have CAP water allocations under various water settlements with multiple parties, including the federal government. Three CAP-affected Tribes have water allocations that are not under water settlements (see Figure 19, Table 61, and Section 3.16.3). Agricultural irrigation is the primary intended use for most Indian CAP water deliveries. Other uses may include residential, commercial, industrial, and cultural and recreation uses. Some tribes with water settlements exercise an option to lease their water rights to other users.

3.15.3.3.2 Population and Demographics

Among the 10 reservations, 4 had population declines between 2000 and 2010 (Table 62) (see note under Table 62 regarding Yavapai-Apache Nation public comments). All the CAP counties have experienced population increases (USCB 2010, 2000). Population in the CAP delivery area is expected to grow through 2020 (Table 63).

Table 61. Tribes with CAP Water Allocations.

Tribe/Reservation	County	Reservation Land Area (acres)	Annual CAP Water Allocation (AFA)	Obtained through Water Settlement (AFA)
Ak-Chin Indian Community	Pinal	21,840	75,000 (up to 85,000)	85,000
Fort McDowell Yavapai Nation	Maricopa	24,680	18,233	18,233
Gila River Indian Community	Maricopa, Pinal	371,933	311,800	311,800
Pascua Yaqui Tribe	Pima	892*	500	0
Salt River Pima-Maricopa Indian Community	Maricopa	52,729	39,200	39,200
San Carlos Apache Tribe	Gila, Graham	1,853,841	30,845	30,845
Tohono O'odham Nation	Pinal, Pima	2,774,370	74,000	66,000
Tonto Apache Tribe	Gila	85	128	0
White Mountain Apache	Navajo, Gila, Apache	1,664,972	25,000	25,000
Yavapai-Apache Nation	Yavapai	640**	1,200	0
Total	—	6,765,982	575,906	576,078

Source: CAWCD 2015.
*In public comments submitted by the Pascua Yaqui Tribe, the Tribe stated that CAWCD's information is incorrect, and the Reservation is approximately 2,216 acres, rather than 892 acres.
**In public comments submitted by the Yavapai-Apache Nation stated that CAWCD's information is incorrect, and the Reservation is approximately 1,831 acres, rather than 640 acres.

Table 62. Population 2000 and 2010, Indian Tribes with CAP Water Allocations and Counties in Central and Southern Arizona.

Tribe/Community	Population			% Change
	2000	2010	Change	
CAP-affected Tribes				
Ak-Chin	742	1,001	259	34.9
Fort McDowell Yavapai	824	971	147	17.8
Gila River Indian Community	11,257	11,712	455	4.0
Salt River Pima – Maricopa	6,405	6,289	-116	-1.8
San Carlos Apache **	9,385	10,068	683	7.3
Tonto Apache **	132	120	-12	-9.1
Yavapai Apache **	743	718***	-25	-3.4***
Pascua Yaqui	3,315	3,484	169	5.1
Tohono O'odham	10,787	10,201	-586	-5.4
White Mountain Apache**	12,429	13,409	980	7.9
Combined population of the reservations	56,019	57,973	1,954	3.5
Counties				
Maricopa County, Arizona *	3,072,149	3,817,117	744,968	24.2
Pinal County, Arizona *	179,727	375,770	196,043	109.1
Pima County, Arizona *	843,746	980,263	136,517	16.2
Three-county total	4,095,622	5,173,150	1,077,528	26.3
Arizona	5,130,632	6,392,017	1,261,385	24.6

* The populations shown for these counties include residents living on the relevant portions of the reservations located in the county.
** These tribes/reservations are located outside of the CAP service area and could only receive CAP water via an exchange; therefore, the counties in which they are located are not included in the lower portion of this table.
Source: USCB 2010, 2000.
*** In public comments submitted, the Yavapai-Apache Nation stated that the U.S. Census geography that defined Yavapai-Apache Nation's Reservation land base within census blocks is incorrect; the Yavapai-Apache Nation determined that its 2010 Reservation population was approximately 880 persons, and the table should reflect a growth rate for the Yavapai-Apache Nation of 3.2 percent, rather than a declining rate of -3.4 percent.

Table 63. Population Forecasts for Central and Southern Arizona, 2010 to 2020.

Geography	2010	2020	Change 2010–2020 (%)	Total Change (%)
Maricopa County	3,824,100	4,506,900	682,800	18
Pinal County	376,400	493,200	116,800	31
Pima County	981,200	1,100,000	118,800	12
Regional Total	5,181,700	6,100,100	918,400	18

Source: Arizona Department of Administration 2012a.

3.15.3.3.3 Minority Race Environmental Justice Populations

The environmental justice assessment for the CAP recipients is focused on the counties and reservations where the CAP water deliveries are made to CAP customers and where the associated socioeconomic effects may occur. This area includes 10 American Indian reservations with minority populations sufficient to warrant EO 12898 consideration (Table 64). Considered in their entirety, the residents of Maricopa, Pima, and Pinal Counties as a whole do not comprise an environmental justice population on the basis of race or on ethnicity. All of the reservations within the CAP service area have sufficient American Indian populations to warrant consideration as environmental justice populations.

Table 64. Minority Race Populations within the CAP Service Area.

Geographic Area	% Race			% Ethnicity
	American Indian	White (Alone)	Other Race(s)	Hispanic or Latino
Ak-Chin Indian Community	100.0	0.0	0.0	3.3
Fort McDowell Yavapai Nation	91.8	3.7	4.5	17.2
Gila River Indian Community	96.1	2.1	1.8	15.3
Pascua Yaqui Tribe	92.4*	3.0	4.6*	23.5
Salt River Pima-Maricopa Indian Community	74.6	22.4	3.0	14.1
San Carlos Apache Tribe	98.3	1.4	0.3	3.5
Tohono O'odham Nation	91.0	4.1	4.9	9.5
Tonto Apache Tribe	75.0	17.5	7.5	12.5
White Mountain Apache	97.1	2.0	0.9	2.6
Yavapai-Apache Nation	88.3**	7.7	4.0	20.6
Maricopa County	2.8	73.0	24.2	29.6
Pima County	4.3	74.3	21.4	34.6
Pinal County	6.7	72.4	20.9	28.5
State of Arizona	5.5	73.0	21.5	29.6
U.S.	1.7	72.4	25.9	16.3

Source: USCB 2015.
*In its public comments, the Pascua Yaqui Tribe states the U.S. Census Bureau information on American Indian composition is incorrect, and that at least 97 percent of its Reservation population is American Indian, rather than 92.4 percent, and the "Other Race(s)" category is 0 percent.
**In its public comments, the Yavapai-Apache Nation states the U.S. Census Bureau information on American Indian composition is incorrect, and that at least 92.3 percent of its Reservation population is American Indian, rather than 88.3 percent, and the "Other Race(s)" category is 0 percent.

3.15.3.3.4 Economic Characteristics

Arizona's economy produced an estimated average gross domestic product of approximately $270 billion from 2010 through 2013. The state's economy is dominated by the service sector, with agriculture, natural resources, and manufacturing providing economic diversity. The direct, indirect, and induced effects of the construction of the CAP as well as the economic contributions of the CAP's water delivery to Arizona's overall economic development (Seidman Institute 2014) include:

- CAP water deliveries represented approximately 30 percent of statewide M&I water deliveries and 11 percent of water used for agriculture between 2007 and 2009.
- Contributions to the statewide gross domestic product associated with those deliveries accounted for an estimated 32 percent of the total statewide gross domestic product during that same period.
- Had CAP water or equivalent other sources not been available during 2007–2009, there would have been 1.09 million fewer jobs in Arizona.
- The estimated economic contributions associated with the CAP water deliveries increased by nearly 50 percent in 2010, but a basis for the dramatic increase was not reported.

Agriculture

Rapid urbanization and conversion of agricultural land to industrial and residential use has resulted in reallocation of water for nonagricultural use; however, agriculture still remains an important economic sector in the region. More than 4,000 farms encompassing nearly 4.3 million acres are located in Maricopa, Pima, and Pinal Counties (Table 65) (USDA-NASS 2014). Land is irrigated with CAP water, groundwater, and water from other sources.

Table 65. Selected Characteristics of Agriculture in Arizona, 2012.

Parameter	Three-County Region	Arizona	Regional Share of the State Totals (%)
Total number of farms	4,272	20,005	21
Land in farms (acres)	4,262,644	26,249,195	16
Value of products sold	$2,028,499,000	$3,732,113,000	54
Net cash farm income from operations	$272,932,000	$600,395,000	45

Source: USDA-NASS2014a.

Agriculture is important for the Ak-Chin, Gila River Indian Community, and the Tohono O'odham Nation. The Fort McDowell Yavapai Apache and the Salt River Pima-Maricopa Indian Community also have farming operations for which they do not currently utilize CAP water.

Development Fund

Beginning in 2010 and pursuant to the Southern Arizona Water Rights Settlement Act of 1982 (SAWRSA), the fixed component of CAP water delivery, which includes repayment of CAWCD's debt obligation to the federal government for CAP construction costs, is paid from the Development Fund (see Section 3.15.3.3.4). Power in excess of what is needed to operate the CAP is sold, and revenues from the sale are deposited into the Development Fund. Revenues accruing to the Development Fund are used to repay CAWCD's obligation to the federal government; to pay fixed operation, maintenance, and replacement charges of CAP water allocated to CAP-affected Tribes; and for other statutory purposes including the Cooperative Fund. Since 2015, there have been no surplus power revenues to support the Development Fund.

The linkages between the availability of excess power, surplus revenues, the repayment obligation, and energy costs are a source of substantial concern for the CAWCD and its tribal and non-tribal customers. Since 2015, there have been no surplus power revenues to support the Development Fund due to the relatively high cost of NGS power for CAP delivery.

Cooperative Fund

The Cooperative Fund was established by the SAWRSA and reauthorized in Title III of the Arizona Water Settlements Act of 2004. The Cooperative Fund is used by the Secretary to carry out his obligations to the Tohono O'odham Nation under the SAWRSA. Obligations include the delivery of CAP water and any associated operation and maintenance costs. The variable or energy component of CAP water deliveries to the Tohono O'odham Nation is paid from the interest income portion of the Cooperative Fund to the extent funds are available (Marquez and Stemmer 2017).

While the Cooperative Fund principal portfolio can never be exhausted, funds in the interest income portfolio are being depleted and are not recovering at a sustainable rate. This is due, in part, to the high cost of NGS energy for CAP water delivery (Marquez and Stemmer 2017).

CAWCD Expenditures Related to the NGS

CAP pumps require baseload resources that are available year-round for 24 hours a day. Currently, the NGS fills that requirement, supplying approximately 90 percent of the CAP system's total power demand (CAWCD 2015b). NGS power used for CAP pumps represents about 64 percent of the U.S.' share; the remainder is available to be marketed to generate revenues for the Development Fund.

Table 66 summarizes CAWCD's customer base, water deliveries, and water delivery revenues for calendar year 2014. Total deliveries for M&I use accounted for 39 percent of the total deliveries and served about 50 percent of the three counties (CAWCD 2014). Water deliveries allocated to tribes accounted for 35 percent of the deliveries. Non-tribal agricultural deliveries and water used in the CAP's recharge program accounted

for the remaining 26 percent of deliveries. Over time, the availability of excess water for non-tribal agricultural deliveries is anticipated to decline as future population growth results in higher M&I use.

Table 66. CAWCD Water Deliveries and Net Water Delivery Charges, 2014.

Customer Category	Number of Customers	Quantity Delivered (AFA) per Customer	Total Quantity Delivered (AFA)	Net Water Delivery Charges Generated
Municipal and Industrial	50	3 to 142,315	503,518	$71,167,812
Federal and Indian	*16	178 to 254,126	534,281	$75,828,463
Agricultural Settlement Pool**	17	66 to 126,978	400,741	$20,071,993
Recharge Program	8	1,230 to 54,839	87,420	$8,806,506
Total	***77	3 to 254,126	1,525,960	$188,290,754

*Includes non-tribal entities that have leased water from tribes with CAP allocations.
**The agricultural settlement pool refers to a group of agricultural customers who agreed to relinquish water rights in exchange for water deliveries via the CAP, those deliveries to be billed at the cost to CAWCD of pumping energy only. The pool is currently 400,000 AFA, decreasing to 300,000 AFA in 2017, 225,000 AFA in 2024, and 0 in 2031 (CAWCD 2015).
***Total accounts for customers that receive water under more than one category.
Source: CAWCD 2015.

The seven largest customers, in terms of water deliveries in 2014, are shown in Figure 21. The combined water delivery to these customers was approximately 61 percent of total deliveries.

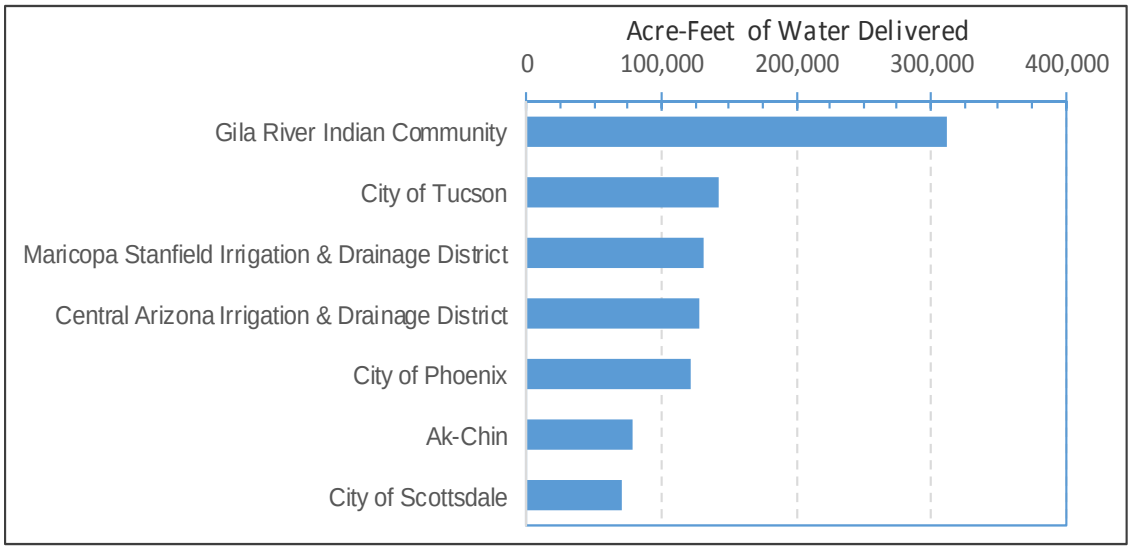

Figure 21. Customers with Highest CAWCD Water Deliveries, 2014.

Source: CAWCD 2015b.

Expenses to operate and maintain the CAP system in 2014 totaled $253.8 million. Of that total, $227.4 million was for operating expenses and $26.4 million was for non-operating expenses. The latter is primarily comprised of the interest portion of CAWCD's federal debt repayment obligation. Together, pumping power and salaries and related labor costs account for the majority of annual operating costs (Figure 22). The CAWCD employs approximately 470 staff who are collectively responsible for the O&M of the CAP.

CAWCD's repayment agreement requires annual payments over a 50-year period, between 1993 and 2045. In 2007, through a Stipulated Settlement, the CAWCD and the U.S. established the principal amount of CAWCD's repayment obligation for the CAP system and storage facilities at approximately

$1.65 billion in conjunction with delivery of 667,724 acre-feet for federal use. The Stipulated Settlement also provided that future net miscellaneous revenues and net revenues from NGS surplus power sales, which accumulate in the Development Fund, will be credited annually against the repayment obligation. The CAWCD's annual repayment obligation in 2014 was $57.8 million, and the remaining balance on the repayment obligation was approximately $1.2 billion. Average annual payments for the period 2014 to 2019 are approximately $56.34 million.

In 2016, the CAP paid $81.2 million for pumping energy from the NGS. Net revenues to the Development Fund totaled $12 million.

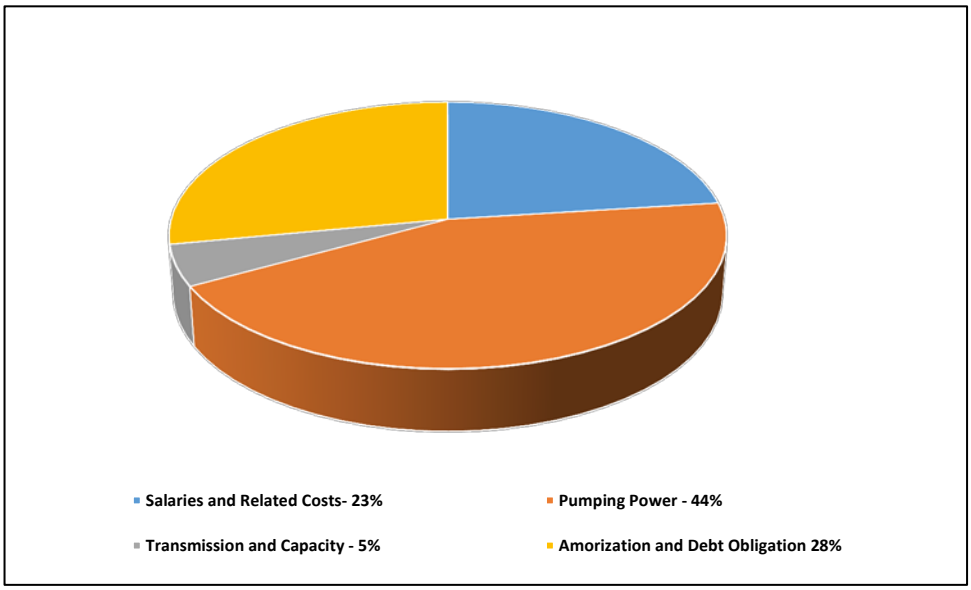

Figure 22. CAWCD Operating Expenses by Major Category, 2014.

Water delivery charges, reimbursements, other revenues, and, to the extent needed, property taxes and interest income are used to pay operating costs associated with delivering water and capital expenditures. Water and energy revenues and property taxes, the two largest categories of revenues, are anticipated to provide 75 percent of all revenues. The Development Fund accounts for about 10 percent of CAWCD revenues (Table 67).

Table 67. CAWCD Budgeted Revenues, 2014.

Source of Revenue	2014 Budgeted Revenues	Percent of Total
Water and energy revenues	$190,444,000	56.1
Water service capital charges	$14,858,000	4.4
Development fund revenues	$34,435,000	10.1
Reimbursements and other	$28,835,000	8.5
Property taxes	$63,984,000	18.9
Interest income and other	$6,708,000	2.0
Total budgeted revenues	$339,264,000	100.0

Source: CAWCD 2015.

Water delivery rates vary by category of customer and are set on a per acre-foot basis, with the total rates for a customer comprising as many as three components: a fixed O&M charge, charge to cover costs of

pumping energy, and capital charges. These charges are outlined in Table 68 and Figure 23. The rates for 2014 deliveries ranged between $67 and $166 per acre-foot.

Energy charges include the cost of energy delivered to the CAP system to pump water from the Colorado River through the CAP system. They include a rate stabilization component—essentially a credit used to protect customers from mid-season rate adjustments if the price of energy fluctuates outside the expected range. Excess credits are applied to the following year's charges.

The CAWCD is authorized to levy two ad valorem taxes on all taxable property within its boundaries. The first, not to exceed $0.10 per $100 of assessed valuation, can be used to fund CAWCD's operations and payment of its repayment obligation to the U.S. The second, not to exceed $0.04 per $100 of assessed valuation, can support operations or repayment or be used to provide for water storage. In 2014, CAWCD levied both taxes at their maximum permissible rate. Together the two taxes yielded $63.98 million.

Table 68. CAP 2014 Rates per Acre-Foot of Delivered Water.

Rate Component	Customer Category				
	Municipal and Industrial Long-Term Subcontract	Excess Water (Non-subcontract) *	Federal/ Indian	Agricultural Settlement Pool	Recharge
Fixed O&M	$79	$79	$79	NA	$79
Pumping Energy	$67	$67	$67	$67	$67
Capital Charges	NA	$20	NA	NA	$20
Total	$146	$166	$146	$67	$166

*Excess water (non-subcontract) customers are those with options to take delivery of water that can become available when the amount of water exceeds contracted deliveries under long-term contracts and subcontracts.
NA = not applicable.
Source: CAWCD 2015.

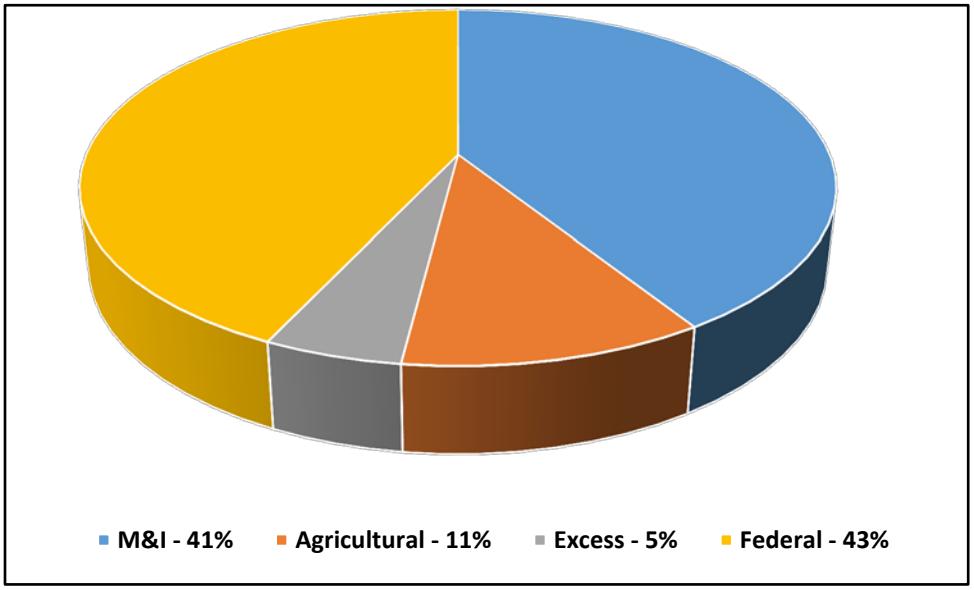

Figure 23. Water and Energy Delivery Revenue by Major CAWCD Customer Category, 2014.

Low-Income Environmental Justice Populations

Considered in their entirety, the residents of Maricopa, Pima, and Pinal Counties are not considered environmental justice populations on the basis of low-income status. All CAP-affected Tribes are considered environmental justice populations based on the meaningfully greater percentage of residents and families below the poverty level as compared to those in surrounding areas, Arizona, and the U.S. The tribes generally have lower MHIs, higher poverty rates, greater income disparity, and higher dependency on public assistance when compared to Maricopa, Pima, and Pinal Counties, Arizona, and the U.S. (Table 69).

Table 69. Income Characteristics of CAP-affected Tribes.

Tribe / Geographic Unit	MHI	Households with Income Less than $25,000 (%)	Families Below Poverty Level (%)	Persons Below Poverty Level (%)	Households Receiving Public Assistance* (%)
Ak-Chin Indian Community	$24,766	50.4	47.6	52.2	34.2
Fort McDowell Yavapai Nation	$44,643	28.7	31.5	37.3	17.1
Gila River Indian Community	$24,320	50.6	47.6	51.9	50.3
Pascua Yaqui Tribe	$28,087	43.6	41.0	46.3	69.3
Salt River Pima-Maricopa Indian Community	$33,459	40.8	24.4	30.9	22.0
San Carlos Apache Tribe	$27,542	45.8	42.2	49.2	76.8
Tohono O'odham Nation	$25,613	49.5	39.4	46.6	48.6
Tonto Apache Tribe	$30,000	13.9	28.6	31.6	2.8
White Mountain Apache	$26,339	47.3	41.4	46.0	64.4
Yavapai-Apache Nation	$31,250	36.1	32.6	37.2	46.2
Maricopa County	$54,222	15.8	12.6	17.0	17.4
Pima County	$46,162	18.4	13.3	19.3	22.6
Pinal County	$49,477	16.2	12.0	17.3	20.2
State of Arizona	$50,255	24.0	13.3	18.2	18.4
U.S.	$53,898	23.1	11.3	15.5	19.2

*Includes Supplemental Security Income, cash public assistance, and Food Stamp/SNAP benefits.
Source: USCB 2015.

3.15.3.3.5 Sociocultural Conditions

The CAP is economically important to Arizona, its largest population centers, and a large portion of its agricultural sector. The availability of CAP water allows central and southern Arizona communities to protect groundwater supplies and reduce overdrafting of the aquifers. The availability of a reliable water supply is a key contributor to the economic vitality and quality of life in the communities and tribes served by the CAP, which includes over 80 percent of the population in the state (CAWCD 2014). The CAP contributed to almost half of Arizona's gross state product in 2010 (Seidman Institute 2014).

The CAP water serves important cultural, social, and economic functions for the tribes that receive water. Prior to European settlement, water supported hunting, fishing, gathering, agriculture, cultural ceremonies, and sophisticated irrigation systems. European settlers diverted waters away from reservations (Gila River Indian Community n.d.; Lewis and Hestand 2006; Pueblo of Zuni 1999; Tohono O'odham Nation 2014; Waldman 2006). In some cases, water scarcity on reservations resulted in economic dependency, malnutrition, and disease (Gila River Indian Community n.d.; Lewis and Hestand 2006). Arizona's tribes have fought for water rights under the Winters Doctrine, which stipulates that when Congress set aside lands for a reservation, it implicitly reserved sufficient water to fulfill the purposes of the reservation. In 2001, the Arizona Supreme Court concluded that Indian reservations were

established as homelands, and the court articulated a homeland standard for the measure of reserved water rights based on tribal economic development plans, cultural needs, and historic water uses (Cosens 2002).

As noted above, the tribes use their CAP water in a variety of ways. Tribes have plans to support future agricultural and development uses and population growth, to accomplish their economic development and tribal self-determination goals. Some tribes such as the Gila River Indian Community have stated that water rights settlements and the availability of CAP water at affordable rates will allow reestablishment of traditional irrigation-based agriculture on their reservations (Gila River Indian Community n.d., 2014; NREL 2012a).

3.15.4 Environmental Consequences

This section describes the direct and indirect consequences of the No Action and Proposed Action alternatives, and the cumulative consequences of the Proposed Action. In February 2017, SRP and the other NGS Lessees announced they no longer intend to operate the NGS after the Existing Lease expires on December 22, 2019 (SRP 2017a). The Existing Lease requires the retirement of NGS facilities by December 2020. The Proposed Action, if approved, would delay the start of retirement activities until December 23, 2019. Thus, the socioeconomic consequences of the Proposed Action are primarily associated with the 2 years of NGS operations, additional lease payments, and the benefits to the Nation of 500 MW of capacity on the STS and WTS as provided by the Extension Lease.

The economic consequences of NGS closure are an outcome of the expiration of the Existing Lease. Reclamation and BIA are not determining if NGS retirement would occur; rather, their approval of the Proposed Action would delay the start of closure and retirement activities. As such, the socioeconomic consequences of NGS closure and retirement are discussed under the No Action alternative, and the socioeconomic consequences of the Extension Lease are discussed under the Proposed Action. The socioeconomic consequences for the No Action alternative and Proposed Action within northeastern Arizona, the Nation, Hopi Reservation, and CAP counties and tribes are summarized in Table 71.

3.15.4.1 Northeastern Arizona, Nation, and Hopi Tribe

Because the NGS and the KM are interrelated in terms of impacts on employment and revenues within northeastern Arizona and on the Nation and Hopi Reservation, the consequences under each alternative are addressed for those facilities together.

Table 71 (following Section 3.15.4.3) and Table 72 (following Section 3.15.4.5) provide side-by-side summaries of the consequences of NGS retirement and KM closure, the No Action alternative, and the Proposed Action for northeastern Arizona, the Nation, and the Hopi Tribe.

3.15.4.1.1 No Action Alternative

Under the No Action alternative, the NGS would cease to operate by December 2017, and retirement activities would commence as described in Section 2.4 and would be completed by December 2020. Access to the NGS site for monitoring and remediation post-2020 would require an additional agreement between the NGS Lessees and the Nation. The consequences of NGS retirement would begin in 2017 when the NGS is taken offline and the retirement activities commence. Overhauls scheduled for 2017, 2018, and 2019 would be canceled. Some of the retirement activities and the associated socioeconomic and environmental justice effects could occur prior to NGS retirement but are assumed to begin in 2018. For example, coal mining at the KM may cease before the NGS plant stops operation to facilitate depletion of storage stockpiles at the plant and mine. Hiring preference for NGS personnel undertaking retirement activities would be given to qualified Navajo applicants. Reclamation activities and associated jobs and revenues would end in 2020. NGS Lessees would pay lease payments as required pursuant to the Existing Lease through December 22, 2018.

Socioeconomics

Under the No Action alternative, adverse socioeconomic impacts in northeastern Arizona that would result from NGS closure would be widespread and long-term. Because the NGS and the KM are among the largest private sector employers in northeastern Arizona, the effects would extend to Coconino, Navajo, and Apache Counties and throughout the state. The subsequent loss of existing jobs and income and reductions in revenues paid to the tribes and local governments would result in adverse effects on the socioeconomic environment, given the persistently high unemployment and poverty rates on the reservations and the importance of the revenues that support tribal enterprises, government employment, and social and government services throughout the reservations. NGS closure would also result in the loss of contributions to NGS plant reclamation and retirement costs and to retiree health care. There are no reasonably foreseeable new industrial or commercial developments that might offset or reduce the effects.

Concerns about the NGS's and the KM's historic and current operations and the impacts of their closures were expressed during scoping (see Appendix A, Scoping Report). As noted above, the economic impact of NGS retirement would be experienced most notably on the Nation, Hopi Reservation, and northern Coconino, Navajo, and Apache Counties. The Navajo chapters surrounding the NGS and the KM Permit Area and the nearby community of Page would be affected more than communities further away from the facilities (see Table 45, Table 47, and Figure 18).

Table 70 (following Section 3.15.4.3) outlines the potential effects on employment in northeastern Arizona from closure and retirement. Job losses would total up to 2 percent of the employment in the entire three-county region. Regional labor income would decline by an estimated $261 million per year, which is about 2.7 percent of the regional total. Some of the loss of employment and labor income may be offset in the short term by employment related to NGS retirement activities and to KM closure and remediation activities.

While these losses are relatively minor in the overall regional context, the NGS and the KM have disproportionate economic significance within northeastern Arizona communities, where unemployment is high, income is low, and a high proportion of the population lives below the poverty line. Nearly all of the job and income losses would be experienced in communities where NGS and KM employees live and on the Nation and Hopi Reservation where revenues and payments are substantial shares of revenue. The relatively affluent communities within Coconino County, such as Flagstaff and Sedona, would not experience the effects of NGS and KM closure to the same degree as Page and the communities on the Nation and the Hopi Reservation.

The Nation and Hopi Tribe governments, local governments, and public school districts would see reductions by more than 23 percent of combined annual revenues. The losses would be especially felt by the Hopi Tribe because mining-related revenues account for more than 80 percent of its general fund (see 3.15.3.1.3, Economic Importance of the NGS and the KM). Both tribes would continue to receive various federal grants and contract funds and operate their respective enterprise activities. Grants and contract funds are generally dedicated to sustaining the existing enterprises and providing specific programs, but not to meeting general government expenses that are covered under the tribal governments' general funds. Sociocultural impacts of closure and retirement would be adverse and long-term. Amendment 1 of the Existing Lease stipulates that the Nation would receive minimum coal royalty payments of about $39 million through 2019 (see Section 2.3.1.2), and a similar arrangement may be made with the Hopi Tribe. Table 72 summarizes the primary demographic, economic, and sociocultural effects of the alternatives.

The greatest local economic and social implications of the NGS closure would be felt in the Nation chapters and Hopi communities where of NGS and KM workers live; the city of Page where many NGS workers live and a substantial proportion of indirect and induced effects from the NGS are experienced; Window Rock where the Nation's tribal headquarters are located; and Kykotsmovi where the Hopi Tribe

headquarters are located. Local businesses in Page would experience the loss of business from annual overhauls at the NGS and the year-round induced economic benefits from NGS worker spending.

Because overhauls are scheduled to coincide with the off-season for tourism, retail, lodging, and restaurant establishments would be more heavily affected than other sectors of the economy. Window Rock and Kykotsmovi would experience reduction in funding for government services, potentially resulting in loss of employment. Less acute effects would be experienced in other off-reservation communities where workers may live and where support services are sourced.

Potential sociocultural effects include emigration of families and individuals from the region. Stresses to Navajo and Hopi extended kinship networks may result as individual wage earners relocate in search of employment, leaving their families on the reservations. Because many Navajo and Hopi wage earners support multigenerational families, the closures would likely affect a substantially larger population than a similar off-reservation event in an area with smaller household sizes and lower economic interdependence. Consequently, the closures would result in a decrease in the material standard of living for many Navajo and Hopi and their immediate and extended families. Losses of employment and income would be amplified by Navajo and Hopi cultural and family identities, strong ties to their traditional homelands, and comparatively low educational attainment rates. These factors may limit tribal members' abilities to adapt to economic dislocation through immigration to off-reservation areas where similar employment may be obtained.

Population declines would be expected in Page and some of the Nation's chapters and Hopi villages. Many of these the chapters and the Nation as a whole have experienced population decline over the past 15 years, while northeastern Arizona and the Hopi Reservation have experienced slower growth than Arizona. It is likely that the NGS retirement and KM closure would result in greater declines and slower population growth than would otherwise be expected. Reductions in NGS- and KM-related tribal revenues would reduce Nation and Hopi Tribe governmental services, affecting the quality of life for members of both tribes.

Coconino and Navajo Counties and the local school districts would see reductions of their tax base and property tax revenues. Tax receipts in Coconino County would be reduced by more than $6 million per year. Page would experience declining residential and commercial property values. Future TPT/sales tax receipts due to declining consumer spending and expenditures by NGS participants, PWCC, and their vendors would accrue to the Nation and to local governments in Page, Flagstaff, Gallup, and other off-reservation counties of Coconino, Navajo, and Apache Counties.

Environmental Justice

The adverse socioeconomic effects of the alternatives would be experienced disproportionately by the Nation and Hopi Tribe, as the populations that would be directly affected are predominately Native American Indian and live in communities with high rates of poverty. The socioeconomic effects outlined in Table 71 and Table 72 would all be disproportionately experienced by the Navajo and Hopi in the affected communities and would reverberate throughout the Nation and Hopi Reservation. These effects from the NGS retirement would be experienced primarily by Navajo tribal members. The effects of the KM closure would be experienced by both tribes.

Benefits to health associated with the income and social services that the NGS and the KM provide and support in the affected communities would be lost with the NGS retirement and KM closure. The elimination of the jobs and income would result in widespread unemployment, potential emigration of Navajo and Hopi wage earners in search of employment, and a reduced material standard of living for many Navajo and Hopi families. These effects would be compounded by the fact that many Navajo and Hopi wage earners support an extended family. General health and well-being are closely correlated to community socioeconomic conditions. Communities with high poverty and unemployment rates have

much poorer health statistics and reduced access to health care (see Section 3.13, Public Health and Safety).

Closure of the KM would begin to bring a sense of resolution to Navajo and Hopi who view mining and burning of coal on tribal lands and the use of tribal water for mining as incompatible with their traditional values. This would be in part because mining and coal-fired electric power generation activities would cease and reclamation would occur almost immediately under the No Action alternative.

No additional residents living in the vicinity of the proposed KM would be relocated, no additional grazing lands would be withdrawn, and fewer, if any, culturally important places or landscapes would be disturbed. The land would be reclaimed but not returned to its pre-mining condition, because the reclamation program is designed to increase the livestock carrying capacity and improve the potential for grazing management (see Section 3.12, Land Use and Recreation). The concerns of residents regarding past relocations, grazing withdrawals, disturbance to cultural resources, and removal of artifacts and burial sites would persist.

Environmental justice effects of the No Action alternative on the Zuni Tribe would be as described in Section 3.15.4.3.

3.15.4.1.2 Proposed Action

The key differences between the consequences under the Proposed Action and those under the No Action alternative include the following:

- The Proposed Action would delay the retirement of the NGS 2 years from 2017 to 2019, and the KM would continue to operate to supply coal during that time.
- The Proposed Action would allow 5 years for retirement activities to be completed.
- Under the Proposed Action, the Lessees would have access to the site for monitoring and remediation activities for an additional 35 years beyond 2019.
- The Proposed Action alternative would include provisions for NGS Lessees to pay coal royalty assurances to the Nation and possibly the Hopi Tribe through 2019, and to provide the Nation rent and payments for the life of the Extension Lease (see Section 2.3.1.1, Extension Lease and Memorandum).
- The Nation would receive 500 MW of electrical transmission capacity through continued O&M of the STS and WTS.

The consequences of NGS retirement under the Proposed Action, compared to the No Action alternative, are summarized in Table 70 and Table 71.

Socioeconomics

Under the Proposed Action alternative, the NGS would operate through December 2019, and retirement activities would commence in 2020 as described in Section 2.3.3.1 and would be completed by December 2024. As described above, the socioeconomic and environmental justice impacts of shutting down and retiring the NGS would occur with or without the Proposed Action. The Proposed Action would extend the NGS and KM operations for 2 years and provide some socioeconomic benefits to the Nation and Hopi Tribe (Table 71).

Under the Proposed Action, the effects of NGS closure and retirement would begin in 2019 when the NGS is taken offline and the retirement activities commence. Effects related to the closure of the KM may be experienced earlier. Reclamation activities and associated jobs and revenues would end in 2024. The 2 years of NGS operation and the 1 additional year of reclamation would extend the socioeconomic benefits

of the NGS, resulting in a short-term beneficial effect. As with the No Action alternative, overhauls scheduled for 2017, 2018, and 2019 would be canceled.

The Proposed Action would allow 2 extra years of employment of the Navajo and Hopi and other northeastern Arizona residents, amounting to a total of $522 million in direct and indirect labor income between 2018 and 2019. A total of $265.2 million over 2 years would be from direct employment at the NGS and KM. The 2 years of labor income and revenues may allow time for the implementation of a transition strategy that would offset some of the adverse impacts outlined in Table 70 and Table 71 (IEEFA 2017b).

The Proposed Action alternative would provide benefits for the Nation that the No Action alternative would not. These include:

- greater input and monitoring of retirement activities,
- retention of some additional NGS buildings for future uses,
- receipt of additional revenue and payments (for Hopi and Navajo),
- an additional $10.2 million annually of induced economic benefits to the surrounding communities,
- additional time for the Nation and Hopi Tribe to explore and develop economic development alternatives,
- an additional 2 years of tribal member employment and hiring preferences,
- guaranteed hiring preference for Navajo during retirement activities, and
- up to 500 MW of electrical power transmission capacity through continued O&M of the STS and WTS.

The Extension Lease would incorporate Amendment 1 of the Existing Lease, whereby the Nation would receive minimum coal royalty payments totaling $39 million through 2019 (see Section 2.3.1.2). Furthermore, SRP and the Hopi Tribe would work toward an agreement for coal royalty assurances of about $19 million to be paid to the tribe through 2019 (see Section 2.3.1.4). The Extension Lease would provide that the Nation receive rent and other payments totaling between about $54 million and $128 million (depending on the timing of payments desired by the Nation). The value of the transmission system O&M being paid by the Lessees for 10 years is estimated to be $28.6 million. Depending on the facilities retained by the Nation and possible participation in a new landfill, an additional $166 million or more of in-kind value may be realized by the Nation (see Section 2.3.1). These payments would help offset the impacts that the Nation and Hopi Tribe would experience as direct and indirect results of the NGS retirement and KM closure.

Environmental Justice

The Extension Lease would provide 2 years for the Nation and Hopi Tribe to address and plan for socioeconomic effects on environmental justice populations and to consider strategies for economic growth, the replacement of jobs and revenues, and the development of a sustainable and culturally appropriate economic plan (IEEFA 2017). The benefits of 2 additional years of NGS operations would be notably experienced by Navajo and Hopi tribal members. The 2 additional years of operations at the NGS and the KM would delay the beneficial effects discussed under the No Action alternative, including resolution for Navajo and Hopi who view mining and coal power electrical generation to be contrary to traditional cultural values.

The effects of the Proposed Action on environmental justice populations on the Nation and Hopi Reservation would be long-term and both beneficial and adverse. Beneficial effects on environmental justice populations would result from the 2 additional years of economic benefits from the NGS and KM

operations; however, for those community members who want those operations removed, there would be a 2-year delay in shutting down operations.

Environmental justice effects of the Proposed Action to the Zuni Tribe would be as described in Section 3.15.4.3.

3.15.4.2 STS and WTS on Navajo Tribal Trust Lands

3.15.4.2.1 No Action Alternative

Under the No Action alternative, the STS and WTS on Navajo Tribal Trust Lands would be retired along with the NGS, unless a separate agreement is executed with the Nation that would allow continued O&M of the transmission systems. Decommissioning would begin in 2018 and would be completed by 2020, under the terms of the Existing Lease. Retirement and restoration activities would not be expected to result in additional local employment, changes in population, housing demand, demands for public facilities and services, or changes in fiscal conditions. The Lessees would be responsible for the decommissioning costs.

Environmental justice effects are not anticipated to occur as a result of the No Action alternative as it relates to the STS and WTS, except as described in Section 3.15.4.3.

3.15.4.2.2 Proposed Action

The Proposed Action would allow the continued O&M of the STS and WTS for 35 years with right of extension for an additional 35 years, and would provide the Nation 500 MW of transmission capacity for their use and benefit. The Extension Lease and § 323 Grants would allow the STS and WTS to continue to be operated and maintained through 2054 with an option to extend through 2089 or to decommission by 2056 (see Section 2.3, Proposed Action). Reclamation would grant the Nation use and capacity of 300 MW on the STS and 200 MW on the WTS, with O&M costs paid by the Lessees until 2029.

No new construction on the STS or WTS within Navajo Tribal Trust Lands is foreseen before decommissioning begins. The O&M costs for the STS are estimated to be $28,000 per mile per year, and costs for the WTS are estimated to be $15,000 per mile per year. After 2029, the Nation would be responsible for O&M costs of up to approximately $2.8 million per year for the STS (101 miles) and $30,000 per year for the WTS (1.8 miles) (Smith 2017b). Ultimately, the Lessees would be responsible for decommissioning, removal, and reclamation costs as described above for the No Action alternative. O&M activities would not be expected to result in additional local employment, changes in population, housing demand, demands for public facilities and services, or changes in fiscal conditions. Continued operation of the STS and WTS may provide needed infrastructure for future development at the NGS. The effects of the Proposed Action as it relates to the STS and WTS would be long-term and beneficial.

Environmental justice effects are not expected to occur as a result of the Proposed Action as it relates to the STS and WTS, except as described in Section 3.15.4.3.

3.15.4.3 Pueblo of Zuni

The analysis area for the Proposed Action and No Action alternatives falls within what the Zuni consider to be their ancestral lands. No specific traditional or ongoing cultural use of these areas has been identified by the Pueblo of Zuni; however, as a whole, “these lands and their innumerable environmental resources continue to play fundamental roles in the health and wellbeing of the Zuni cultural environment and they retain intensive ongoing traditional religious and cultural importance to Zuni identity….” (Panteah 2017).

Under the No Action alternative, the leased Navajo Tribal Trust Lands for NGS operations would be returned to the Nation upon completion of retirement activities by the end of December 2020 or as

described in the Retirement Actions, Section 2.4.1.1. A separate agreement would be needed to provide access to conduct long-term monitoring and remediation for an additional 30 years, as required by the CCR regulations. Mine reclamation and restoration would continue for approximately 15 years. If no agreement between the NGS Lessees and Navajo Nation is negotiated, the structures associated with the STS and WTS within Navajo Tribal Trust Lands would be removed and the land restored and returned to the Nation by the end of December 2019.

Under the Proposed Action, NGS operations and associated mining would cease no later than December 22, 2019. Post-operation retirement activities for both the NGS facilities and mine would be similar to those described under the No Action alternative except they would begin 2 years later, and NGS retirement would take 5 years to complete (December 2024). Additionally, the STS and WTS would continue to be operated for an additional 35 to 70 years, and then those portions on Navajo Tribal Trust Lands would be retired.

Under either alternative, the majority of the tribal trust lands upon which the NGS and the KM are located would be returned to their respective tribes after retirement, mine reclamation, and restoration have been completed. These facilities and structures have been present in the human environment for about the past 50 years. Impacts described by the Zuni, from the presence of these facilities and structures over the last half century, either would cease due to retirement or removal, or would continue for the foreseeable future for facilities and structures that remain. There would be no new impacts from ongoing operation and maintenance of the transmission systems.

Table 70. Economic Consequences for Northeastern Arizona of NGS Retirement and KM Closure under the Existing Lease and Extension Lease.

Parameter	Consequences of Closure	Existing Lease (No Action)	Extension Lease (Proposed Action)
Operations			
Annual NGS power production	• Generation at the NGS would cease upon retirement, resulting in reduced workforce and revenues for tribes, communities, counties, and Arizona	NGS workforce and revenues would be reduced beginning in 2018	NGS workforce and revenues would continue through 2019
Annual coal production	• Coal mining would cease at the KM, possibly before NGS retirement, resulting in reduced workforce and revenues for tribes, communities, counties, and Arizona	KM workforce and revenues would be reduced beginning in 2017	KM workforce and revenues would continue through 2019
Reduction in total coal production	• Remaining coal reserves would remain unproduced, resulting in losses of revenue for tribes unless future development occurs	Coal production and resulting revenues would be reduced beginning in 2017	Coal production and resulting revenues would continue through 2019
Annual KM groundwater use (AFA)	• Up to 1,300 AFA less groundwater would be used (see Section 3.8, Water Resources)	Groundwater use would be reduced beginning in 2018	Groundwater use would continue through 2019
Water withdrawals from Lake Powell	• NGS-related withdrawals would cease after retirement activities are complete. The Nation would be able to claim and use former NGS water (see Section 3.8, Water Resources)	Water rights and withdrawals from Lake Powell would be reduced in 2018 and would cease in 2020	Water rights and withdrawals from Lake Powell would continue through 2019, decline to 1,500 AFA in 2020 through 2024, and cease in 2025
NGS- and KM-Related Employment			
NGS direct, including contractors, annually	• 521 jobs would be lost	NGS direct employment would be reduced beginning in 2018; retirement contracting would end by 2020	NGS direct employment would continue through 2019, employment and contracts for most retirement activities would end in 2024, and remediation and monitoring would end in 2054. As NGS employees leave or retire, positions would be filled with contractors, resulting in an increase in contract employment
PWCC direct, including contractors, annually	• 519 jobs would be lost	PWCC direct employment would be reduced beginning in 2018; reclamation employment would end in approximately 2028	PWCC direct employment would continue through 2019; reclamation employment would end in 2030
Overhaul contractors (annual equivalent)	• 124 jobs would be lost	Overhaul contractor employment would be eliminated in 2018	Overhaul contractor employment would be eliminated or substantially reduced through 2019
Tribal jobs, annually	• 562 jobs would be lost	Tribal jobs would be reduced beginning in 2018	Tribal jobs would continue through 2019 and would be partially reduced following 2019 to a level that can be supported with the reduced lease payments associated with the Extension Lease

Parameter	Consequences of Closure	Existing Lease (No Action)	Extension Lease (Proposed Action)
Total indirect/induced jobs, annually	• 2,048 jobs would be lost	Indirect and induced employment would be reduced beginning in 2018	Indirect and induced employment would continue through 2019
Total jobs	• 3,774 jobs would be lost	3,774 jobs would be lost in beginning in 2018	3,774 jobs would continue through 2019
Labor Income and Payments to the Tribes and Local Governments			
Annual labor income	• Loss of up to $261 million per year after NGS retirement and KM closure	Labor income would be reduced beginning in 2018	Labor income would continue through 2019
Access to fringe benefit programs	• Reduced opportunities for current and future workers to realize benefits • Limited alternative employment options with comparable benefits	Opportunities would be reduced beginning in 2018	Opportunities would continue through 2019
Long-term pension and retirement income	• Substantial reductions in future income for many current and potential workers	Pension and retirement income would be reduced beginning in 2018	Pension and retirement income would accrue through 2019
NGS lease payments, in-lieu tax payments, and in-kind value	• Loss $0.6 million per year in lease payments • Loss of up to $2.7 million per year of in-lieu tax payments to the Nation • Loss of up to $5.3 million per year to local school district, Coconino County, and Arizona	NGS payments to the Nation pursuant to the Existing Lease would cease after 2018. The in-kind value of assets retained by the Nation is uncertain.	NGS lease and other payments to the Nation would continue through 2053, pursuant to the Lease Extension, ranging from $54 million to $128 million depending on timing. In-kind value to the Nation would be about $166 million
Coal royalties and bonuses to tribes	• Loss of $19 million to the Hopi Tribe • Loss of $39 million minimum to the Nation for 2018 and 2019 combined	Coal royalties would cease beginning in 2018	Coal royalties would continue through 2019 with a minimum of $39 million to the Nation and possibly $19 million to the Hopi Tribe
KM bonus payments to tribes	• Loss of an average of $7.5 million per year	Coal bonuses would cease beginning in 2018	Coal bonuses would continue through KM closure
KM payments to the tribes and local governments	• Loss of $25.3 million per year between both tribes and local governments	KM payments cease beginning in 2018	KM payments would continue through 2019
KM water payments	• Loss of $1.3 million per year between both tribes	Water payments cease beginning in 2018	Water payments would continue through 2019
NGS and KM scholarships and community contributions	• Loss of $700,000 per year between both tribes	Contributions would cease beginning in 2018	Contributions would continue through 2019
NGS payments for BM&LP Railroad energy from NTUA	• Loss of revenues for the $340,000 23.5 gigawatt hours purchased from NTUA	Payments for and costs of energy would cease beginning in 2018	Payments for and costs of energy would continue through 2019
KM payment for energy from NTUA	• Loss of approximately $9.9 million per year in gross revenue to NTUA • May necessitate rate increases for other energy users	Payments for and costs of energy would cease beginning in 2018	Payments for and costs of energy would continue through 2019
Federal Abandoned Mine Lands and Black Lung Funds	• PWCC payments into these funds would cease	Payments for and costs of energy would cease beginning in 2018	Payments into these funds would continue through 2019

Table 71. Socioeconomic Consequences in Northeastern Arizona of NGS Retirement and KM Closure.

Parameter	Consequences of Closure	Existing Lease (No Action)	Extension Lease (Proposed Action)
Population and Demographics	• Population declines would likely occur in the LeChee, Shonto, Kaibeto, and Forest Lake Chapters, and in Page. • Secondary minor population effects may occur over a wide area, including Tuba City, Kayenta, Window Rock, and the Flagstaff area. Flagstaff may be a destination for some households who leave Page, the Nation, or the Hopi Reservation. • A scarcity of available housing and job opportunities on the Nation would limit on-reservation relocation. • Many affected families may maintain local residences, with one or more members relocating to off-reservation areas for long periods of time, transferring money back, and returning periodically. The costs of commuting and maintaining multiple residences would lower the standard of living for these households. This trend would continue and/or increase.	Population and demographics would remain unchanged through 2017	Population and demographics would remain largely unchanged through 2019
Employment and Income	• Local unemployment would increase. Effects would be most pronounced in Page and the LeChee, Shonto, Kaibeto, Forest Lake, and Kayenta Chapters. • Former NGS and KM employees with lengthy tenure and vested retirement benefits may choose to retire and maintain their present on- or off-reservation residence. • Former NGS and KM employees without tenure and vested retirement may relocate for economic reasons, either elsewhere on the reservation or off-reservation. • SRP may offer transfers to other facilities to some employees. • Additional Navajo and Hopi would become unemployed in response to cutbacks necessitated by reductions in funding. • Strong cultural and family ties may reduce the likelihood of household migration. This may result in long-distance commuting for employment. • Businesses in Page, Kayenta, other communities on the Nation and the Hopi Reservation, Flagstaff, and elsewhere would see reductions in business revenues due to lower consumer spending and purchases by the NGS and KM employees, contractors, and vendors. • Reductions in sales would result in some layoffs or reduced hours for workers, adjusted hours of operation, or other adjustments for local businesses. Some business closures could occur.	Employment and income would be reduced beginning in 2018	Employment and income would continue through 2019

Parameter	Consequences of Closure	Existing Lease (No Action)	Extension Lease (Proposed Action)
Economic Importance for the Nation and Hopi Tribe	• Most of the workers directly affected by the NGS retirement and KM closure would be Navajo. • Loss of NGS- and KM-related jobs would lower the material standard of living for Navajo and Hopi workers unable to find replacement jobs at relatively comparable salaries and benefits and without increases in commuting costs. • Because Nation and Hopi households tend to be multigenerational and larger than typical households (and therefore more economically interdependent), greater numbers of people would be impacted by the loss of each job held by tribal members than would be expected among the off-reservation populations. Relocation of wage earners would result in widespread and potentially severe stress on families and households. • The loss of NGS- and KM-related revenues would substantially affect the funding available to the Nation and Hopi Tribe to deliver services and maintain tribal employment. • The loss of NGS- and KM-related revenues would result in severe cutbacks in tribal services and jobs, which would affect residents throughout the Nation and Hopi Reservation. • There is no presently identified or foreseeable commercial or industrial project in the region with the potential to offset the loss of employment, income, and public sector revenues associated with the NGS and the KM for northeastern Arizona. • Post-retirement land-use restrictions on NGS landfill pond sites would prohibit any future use of 645 acres (see Section 3.12, Land Use and Recreation), rendering them valueless as leasable or developable property. The Nation would be prohibited from using or leasing these areas for any purpose, thus eliminating any potential economic benefit from development or revenues from leasing. Other areas of the NGS site could be leased or developed for industrial use only. • NGS structures retained by the Nation would be available for future use.	Economic characteristics would be adversely affected beginning in 2018	Economic characteristics would be beneficially affected through 2019
Economic Importance of NGS for Northeastern Arizona	• NGS retirement would adversely affect economic diversity in Page. • The loss of the annual NGS overhauls would eliminate an important source of off-season (relative to tourism) commerce for lodging, dining, and other retail and service businesses. • Closure of the NGS also would eliminate NGS corporate and employee support for and participation in civic, service, and charitable initiatives.	Economic characteristics would be adversely affected beginning in 2018	Economic characteristics would be beneficially affected through 2019
Navajo and Hopi Traditional Values	• Mining-related disturbance of places and landscapes that have cultural and religious significance would cease. • Concerns about residual effects on cultural resources and the disposition of previously removed artifacts and burial sites would likely persist. • Navajo and Hopi who believe that mining is incompatible with traditional culture and beliefs would likely be satisfied with closure of the NGS and the KM.	Cultural concerns about mining and coal combustion would persist, but resolution specific to the NGS and the KM would occur upon retirement in 2018	Cultural concerns about mining and coal combustion would persist, but resolution specific to the NGS and the KM would occur upon retirement in 2019

Parameter	Consequences of Closure	Existing Lease (No Action)	Extension Lease (Proposed Action)
Housing Characteristics	• Greater need for housing assistance would result due to loss of income. • Housing availability in Page would likely increase as the number of homes for sale and rentals available increases. • Property value and cost of living would decline as housing supply increases and demand declines. • Relocations of residents to accommodate mining would cease. • Withdrawal of grazing lands to accommodate mining would cease. • The effect of KM closure on the ability of residents in and near the KM to obtain homesite leases is uncertain. • Road maintenance related to mine operations in and near the PWCC lease would be substantially reduced. • Loss of free and affordable coal for home heating near the KM would result in an adverse effect on local residents' housing, but may result in a beneficial effect on human health.	Housing characteristics would be adversely affected beginning in 2018	Housing characteristics would be beneficially affected through 2019
Community Facilities and Services	• Reduced revenues would result in cutbacks to Nation and Hopi tribal staffing and services. • Reduced revenues and cutbacks would affect the availability of services across the entire Nation but would be more strongly felt on the Hopi Reservation. • Reduced revenues would result in less funding for public facilities and services in Page, Flagstaff, and Coconino, Navajo, and Apache Counties. • Demands for some services would be reduced due to declining populations. • Demands on social services, unemployment, work force training, and other similar services may increase due to the loss of employment and income.	Community facilities and services would be adversely affected beginning in 2018	Community facilities and services would be beneficially affected through 2019
Sociocultural Issues	• No additional disturbance of the physical and cultural setting would occur. • Residents within and near the KM area who value the traditional setting over employment opportunities and PWCC-supplied coal, water, firewood, and services would likely be satisfied upon closure and successful reclamation. • Environmental and health concerns voiced by residents related to the NGS and the KM would be substantially reduced upon closure and likely cease at the conclusion of reclamation. Concerns about previous health effects could persist. • Concerns expressed by residents about potential depletion and degradation of groundwater may lessen if long-term effects on the aquifer do not materialize. See Section 3.8, Water Resources, for the assessment of impacts on water resources.	Sociocultural issues would persist after 2017	Sociocultural issues would persist after 2019
Navajo, Hopi, and Zuni Traditional Values	• Mining-related disturbance of places and landscapes that relate to traditional values would cease. • Concerns about adverse effects on cultural resources and traditional cultural properties would likely persist. • Navajo, Hopi, and Zuni who believe that mining is incompatible with traditional culture and beliefs would likely be satisfied with closure of the NGS and the KM.	Cultural concerns about mining and coal combustion and traditional values would persist, but resolution specific to the NGS and the KM would occur upon retirement in 2018	Cultural concerns about mining and coal combustion and traditional values would persist, but resolution specific to the NGS and the KM would occur upon retirement in 2019

3.15.4.4 CAP—Central and Southern Arizona Counties and Tribes

3.15.4.4.1 No Action Alternative

Socioeconomics

Energy Sources and Costs

NGS retirement would necessitate actions on the part of CAWCD to secure dependable alternative sources of 2.7 terawatt hours of electrical power and energy to operate the CAP system. Options may include natural gas energy or renewable energy sources. Replacement energy supply and delivery agreements would need to be in place and operational when the NGS is taken offline. The replacement agreement could involve a short-term purchase agreement to acquire energy from existing generating sources and a long-term agreement based on power from new sources.

The cost of NGS energy exceeds the current energy market prices (CAWCD 2017; IEEF 2017; NREL 2017; U.S. DOE 2017). Using energy from sources other than the NGS would translate to reduced costs to CAP water users. CAWCD estimates that the CAP would have saved $38.5 million if it had purchased energy on the market instead of paying for it from the NGS in 2016. This would have lowered energy rates for CAP recipients by $27/AFA.

Without surplus energy sales that go into the Development Fund, which would cease when the NGS closes, CAWCD would have to collect an estimated $12 million more a year for repayment of its obligation, under current market conditions (CAWCD 2017). The savings from purchasing energy on the market would outweigh the additional costs to CAP water users for debt obligation. Savings would have amounted to $9.6 million savings for CAP-affected Tribes, $7.5 million savings for agricultural recipients, and $9.3 million savings for M&I recipients. This scenario assumes that CAP M&I recipients would absorb the costs for repayment from loss of surplus energy sales (see below and CAWCD 2017).

Development Fund and Cooperative Fund

Surplus energy sales and revenues supporting the Development Fund would cease when the NGS retires. CAWCD would be required to compensate for the loss of Development Fund revenues to fund the CAP debt obligations. Other resources available include the capital charges assessed to M&I customers, reserves, ad valorem/property taxes, or adjustments in other budgeted expenditures. The loss of surplus revenue sales could increase pumping energy rates on the order of $10 to $15/AFA for M&I users, but this would be offset by reduction in the cost of energy needed for pumping. NGS retirement would result in a reduction of the cost for CAP water by between $12 and $27/AFA.

Under the No Action alternative, the variable energy rates for delivery of CAP water would be lower, resulting in reduced drawdown of the Cooperative Fund. However, the No Action alternative would result in energy cost savings to all CAP water users. This would translate into lower rates of depletion for the Cooperative Fund interest income with respect to the Tohono O’odham Nation.

Under the No Action alternative, the savings to CAP recipients discussed above would begin in 2017 when the NGS goes offline. The No Action alternative would result in long-term beneficial effects on CAP recipients, including members of the 10 CAP-affected Tribes, as there would be a net reduction in the cost of energy to run CAP pumps beginning as soon as 2017. This benefit depends on the costs of energy staying low and the terms of any agreements CAWCD enters into with energy providers.

Environmental Justice

As discussed above, the CAP recipients, including the 10 CAP-affected Tribes, would experience long-term beneficial effects from the No Action alternative, beginning when the NGS goes offline in 2017. Rates for water would likely be lower after the NGS goes offline, as energy purchased on the market is

predicted to be less expensive to purchase than the NGS is to operate. This would result in a lower draw on the Cooperative Fund. This benefit depends on the costs of energy remaining low and on the terms of any agreements CAWCD enters into with energy providers.

The overall effect of the No Action alternative on the CAP-affected Tribes would be beneficial, as the energy cost savings would outweigh the loss of revenues from the Development Fund; and would result in reducing the depletion of interest income from the Cooperative Fund. There would be no disproportionate adverse environmental justice effect on the CAP-affected Tribes as a result of the No Action alternative.

3.15.4.4.2 Proposed Action

Socioeconomics

Energy Sources and Costs

Under the Proposed Action, the CAP would pay higher costs for NGS energy for 2 years compared to the No Action alternative. At the rates discussed above, an additional $26.4 million would be charged to CAP recipients over 2 years for delivery of CAP water. The rate for energy that the CAP purchases from the NGS would likely remain above the market price, which would elevate the cost of energy an estimated $27/AFA at 2016 rates until the NGS is retired in 2019. This would result in a short-term adverse effect on CAP recipients. The savings accrued after 2019 when the NGS goes offline would result in long-term beneficial effects to CAP recipients, including the CAP-affected Tribes.

Development Fund and Cooperative Fund

The higher projected energy rates associated with the Proposed Action would result in increased CAP water delivery costs to the CAP-affected Tribes, resulting in a short-term adverse effect. After 2019, the effects of the Proposed Action would be the same as under the No Action alternative.

Environmental Justice

Under the Proposed Action, all CAP rate payers, including CAP-affected Tribes, would pay higher costs for the CAP pumping energy for 2 years compared to the No Action alternative. However, the tribes would not experience a disproportionate adverse effect when compared to the larger CAP delivery area.

Water that the CAP-affected Tribes lease to M&I users would be subject to increased O&M costs, but these would be paid by the water lessees and would not likely depreciate the value of the CAP-affected Tribes' water to be leased to non-tribal entities. The costs for water used by the CAP-affected Tribes for agriculture would be higher for 2 years. This would result in a short-term adverse effect when compared to the No Action alternative, but would not be disproportionate compared to CAP recipients at large.

3.15.4.5 Summary

Table 72 outlines the socioeconomic consequences of the No Action alternative and the Proposed Action. The Proposed Action would result in long-term adverse and beneficial effects on the socioeconomic conditions, most notably on the Nation and Hopi Reservation and in northeastern Arizona. Recipients of CAP water, including CAP-affected Tribes, would also experience long-term effects from the NGS retirement.

Table 72. Summary of Consequences of Alternatives.

Alternative	Navajo Nation	Hopi Tribe	Northeastern Arizona	CAP Communities and Tribes
No Action (Existing Lease)	• The NGS would be retired according to the Existing Lease terms. Reclamation would be completed by 2020. • The KM would be closed in conjunction with NGS retirement. • Lease and in-lieu tax payments of up to $3.3 million per year would cease after 2018. • Coal royalty payments of up to $20 million per year would cease in 2018. • Coal bonus payments would cease upon KM closure. • NGS- and KM-related jobs, retirement accrual, and fringe benefits would be lost after retirement. • NGS and KM community contributions would decrease or cease after retirement. • Payments for energy and water use would cease upon KM closure.	• The KM would be closed and reclaimed in conjunction with KM retirement. • Coal royalties of up to $10 million per year from PWCC would cease upon KM closure. • Coal bonus payments would cease upon KM closure. • KM-related jobs, retirement accrual, and fringe benefits would be lost after retirement. • KM community contributions would decrease or cease after retirement.	• NGS and KM payments and taxes to local and state governments would cease upon closure. • NGS- and KM-related jobs, retirement accrual, and fringe benefits would be lost after retirement. • Effects on population and demographics, economic diversity, tourism, income, employment, and social services would be experienced after NGS and KM closure.	• The CAP would cease to purchase energy from the NGS at above market cost, resulting in up to $27/AFA reduction in cost to CAP recipients, including the 10 CAP-affected Tribes. • Surplus energy from the NGS would no longer be available to support the Development Fund. The revenue needed to pay the CAP's debt obligation would be paid from other sources, including increased capital charges by M&I recipients. • Lower energy rates for CAP water deliveries would benefit the Tohono O'odham Nation by reducing the rate of depletion of the Cooperative Fund.

Alternative	Navajo Nation	Hopi Tribe	Northeastern Arizona	CAP Communities and Tribes
Proposed Action (Extension Lease)	• An additional 2 years of employment at NGS and KM would result in sustained direct labor income, amounting up to $265.2 million, mostly for Navajo workers. • A minimum of $39 million in coal royalties would be paid to the Nation through 2019. • NGS-related value (lease payments, retained assets, transmission value, adjustments, and new landfill) would total up to $323 million. • The Nation would receive 500 MW transmission capacity for 35 to 70 years, and the Lessees would pay for STS and WTS O&M for 10 years.	• The KM would continue to operate until coal is no longer needed to supply the NGS, resulting in sustained employment and revenues up to $70 million. • A minimum of $19 million in coal royalties may be paid to the tribe through 2019.	• An additional 2 years of employment at NGS and KM would result in sustained regional direct and indirect regional labor income, amounting up to $522 million. • Indirect economic effects, such as NGS worker spending in communities, population and demographic characteristics, and social services, would be sustained for an additional 2 years.	• The CAP would continue to purchase energy from the NGS at above-market cost for 2 years, resulting in up to $27/AFA more in cost to CAP recipients, including the 10 CAP-affected Tribes. • As with the No Action alternative, surplus energy from the NGS would no longer be available to support the Development Fund. The revenue needed to pay the CAP's debt obligation would be paid from other sources, including increased capital charges by M&I recipients. • After 2019, there would be the same effect as the No Action alternative on the CAP-affected Tribes.

3.15.5 Cumulative Effects

3.15.5.1 Northeastern Arizona, Nation, and Hopi Tribe

The following past, present, and reasonably foreseeable future activities are located in or may involve regional-level actions or programs affecting the Nation, Hopi Tribe, or communities in northeastern Arizona.

3.15.5.1.1 Continued Operation or Retirement of Parts of Other Regional Coal-Fired Power Plants

The San Juan Generating Station and San Juan Mine, Four Corners Power Plant and Navajo Mine, and several other power plants and coal mines operate within the general region (northeastern Arizona and northwestern New Mexico). These collectively contribute to the region's economic base, Navajo Nation employment and revenues, and to the fiscal and economic stability of the region.

Several of these power plants have recently undergone changes or have plans for retrofits, closing of one or more units, conversion to natural gas, or changes of ownership (see Section 3.1.2.1). Socioeconomic data on the effects of these changes is not readily available, but concerns about these changes generally underscore the importance of jobs, income, and tribal revenues associated with power generation on the Nation and within the region. Changes to employment and operations at these facilities, together with either of the alternatives, would result in socioeconomic effects. Closures or reduction of production would contribute to loss of jobs and decreased revenues on the Nation and in the region, further amplifying the effects of the NGS retirement and KM closure. However, the Proposed Action, which includes 2 years of continued employment, Navajo Nation and Hopi Tribe revenues, and other economic returns and opportunities during retirement activities, would partially offset adverse impacts from retirement of NGS or other power plants and mines in the short term and medium term.

3.15.5.1.2 San Juan River Water Usage and Projects

San Juan River water supports a variety of socioeconomically important practices on the Nation and in off-reservation communities, including irrigation for agriculture, industrial use including at the FCPP and San Juan Generating Station and Mine, municipal drinking water, cultural preservation, and ecological conservation. San Juan River water projects support the Nation's agriculture enterprise, NAPI, as well as culturally important sheep and cattle ranching. After the Gold King Mine Spill in 2015, the Nation cut off San Juan River water from irrigation canals and supply systems in order to protect human and ecological health for a short time. Barring future shortages of San Juan River water and other events that would prevent use of the water on the reservation, water would continue to sustain population growth, economic development, agriculture and ranching, and tribal enterprises. While past, present, and future San Juan River water projects, taken together with the Proposed Action, would not likely result in measurable effects to the Nation's socioeconomic conditions, they are both a part of the larger economy and context.

3.15.5.1.3 Glen Canyon Long-Term Experimental and Management Plan

The LTEMP would result in management of water and biological resources and energy production related to Glenn Canyon Dam, including Lake Powell and the Colorado River through the Grand Canyon. The LTEMP may result in effects on recreation and cultural resources, which are socially and economically important in the region, as well as the energy supply to local communities. Many of the Navajo residents in the chapters surrounding the NGS do not have electrical power. Glenn Canyon Dam provides the municipal power source for the city of Page. Sustaining a reliable source of power while conserving the scenic, cultural, and recreation resources in the area would result in beneficial socioeconomic effects on local communities, to which the Proposed Action would have a small contribution through the elimination of air pollution and deposition on water and soil from the NGS.

3.15.5.1.4 Navajo Nation and Hopi Community Water Supply Wells (including Manymules Project)

As discussed in this section, many Navajo and Hopi households lack water supplies and must haul water for consumption and livestock. Communities on the Nation where increased water demand may occur include Tuba City and the towns and chapters of Kayenta, Shonto, and Pinon. Hopi communities include Moenkopi and Polacca districts. Proposed new Hopi villages would also require additional groundwater sources.

The Manymules Water Project (discussed above in Section 3.15.3.1.4 and also Section 3.2.1.7) and the Hopi Arsenic Mitigation Project (see Section 3.2.1.8) would supply uncontaminated water to communities on the reservations. These and any other projects to deliver water to reservation communities may result in a slight offset of adverse effects if households affected by the NGS retirement or KM closure receive potable water as a result of the project. Currently, PWCC pays for the O&M of the wells. After the KM is closed, residents would be required to assume these costs, resulting in increased household expenses for residents benefiting from the project. The overall effect of the Manymules Water Project in the indirect effects analysis area is beneficial, and the Proposed Action would result in a slight decrease of these benefits.

3.15.5.1.5 LeChee Electrification Project

Many residences on the Nation and Hopi Reservation do not have electrical power. The LeChee Electrification Project has resulted in 63 homes within the LeChee Chapter receiving electrical power. Completed in 2015, the project was funded by the Lessees, NTUA, the Navajo Nation Abandoned Mine Lands Program, the U.S. Department of Housing and Urban Development, and grants obtained by LeChee Chapter (Morrison 2014). Power is supplied to the 63 homes in the LeChee Chapter by the NTUA and would continue after the NGS is retired. The LeChee Electrification Project has had a beneficial effect on the communities within the direct effects analysis area. The Proposed Action would not contribute to or diminish these benefits.

3.15.5.1.6 Former Bennett Freeze Area IRMP and District 3 RMP

A portion of the STS falls within both within the District 3 LMD and the former Bennett Freeze Area, where grazing management plans are underway. A portion of NGS and KM employees live within these areas. Livestock grazing is practiced widely by the Navajo, and it is likely that these NGS and KM employees' families within these areas have grazing permits. The IRMP and RMP would result in long-term socioeconomic benefits to those with grazing permits in these areas, as sustainable land use management would be implemented. The Proposed Action would not contribute to or diminish these benefits.

3.16 Indian Trust Assets

Indian trust assets are "'legal interests' in property held in 'trust' by the Federal Government for federally recognized Indian tribes or individual Indians" (Reclamation 1994). Trust assets may include lands, minerals, hunting and gathering rights, water rights, groundwater, and instream flows. Cultural and paleontological resources located on Indian trust lands also may be Indian trust assets in some specific situations. The U.S., with the Secretary of the Interior as the Trustee, holds many assets in trust for Indian tribes or Indian individuals (Reclamation 1993a).

As summarized in Section 3.1.1, because the KM has already undergone environmental compliance with OSMRE, the assumptions, analysis areas, affected environment, and environmental consequences for the KM are drawn from the KM EA (OSMRE 2017).

3.16.1 Regulatory Framework

The U.S. has a trust responsibility to protect and maintain rights reserved by or granted to Indian tribes and individuals by treaties, statutes, and EOs. The Secretary of the Interior must approve most actions involving and affecting Indian trust assets, except in those instances where a tribe itself has obtained and chosen to exercise such authority. The Secretary has delegated that responsibility to BIA (Reclamation 1994). BIA has granting authority over ROWs on Indian lands according to 25 CFR Part 169 including subpart 112 (monetary compensation for ROW over or across Indian land); has approval authority over leasing on Indian land for housing, economic development, and other purposes according to 25 CFR Part 162; and has authority over leasing of tribal and allotted lands for mineral development according to 25 CFR Parts 211 and 212. BIA also enforces reclamation on lands mined prior to the passage of SMCRA.

For the KM, which recently underwent NEPA and NHPA compliance, OSMRE is responsible for protection of Indian trust assets. According to OSMRE Directive 979, which sets forth policies and procedures the agency follows to ensure that OSMRE action complies with Indian trust asset responsibilities, "OSMRE personnel must ensure that Bureau actions identify, conserve, and protect lands and other resources that the Department holds in trust for federally recognized Indian tribes and tribal members." The directive also states that OSMRE must consult with Indian tribes for actions with the potential to impact trust lands or trust resources, and requires OSMRE to "respect Indian tribal self-government and sovereignty, honor tribal treaty and other rights, and strive to meet the responsibilities that arise from the unique legal relationship between the federal government and Indian tribal governments" (OSMRE 2013).

The primary statutes governing the leasing of Indian coal assets for the benefit of an Indian tribe or nation are the Indian Mineral Leasing Act of 1938 and the Indian Mineral Development Act of 1982. An American Indian Coal Lease is obtained by direct negotiation with Indian tribal authorities but is subject to approval and administration by the U.S. Department of the Interior. The authority by which coal reserves that are Indian trust assets are leased is described in 25 U.S.C. § 396a and concerns leases of un-allotted lands for mining purposes. It states the following:

> *On or after May 11, 1938, un-allotted lands within any Indian reservation or lands owned by any tribe, group, or band of Indians under Federal jurisdiction, except those specifically excepted from the provisions of Sections 396a and 396g of this title, may, with the approval of the Secretary of the Interior, be leased for mining purposes, by authority of the tribal council or other authorized spokesmen for such Indians . . . .*

In addition to NGS operations and mineral exploration, land use adjacent to the study area includes residential, commercial enterprises, livestock grazing, and traditional uses. Many of the residents graze cattle, sheep, goats, and other livestock as a food source and for income.

3.16.2 Analysis Areas

The analysis areas for Indian trust assets are Navajo Tribal Trust Lands that may be directly impacted by NGS closure and the indirect effects on Hopi Reservation lands and CAP-affected tribes.

3.16.3 Affected Environment

The Navajo Nation is a federally recognized Indian tribe whose reservation covers 12.5 million acres within New Mexico, Utah, and Arizona. The Navajo Reservation initially was established by treaty in 1868 and has been expanded by EOs in 1884, 1900, and 1930. The affected environment for Nation trust assets includes those trust assets that may be affected by the No Action or Proposed Action. These assets are located within the northwest portion of the Reservation, in Arizona. These assets include but are not limited to water, lands, minerals, and traditional land use. The project components that may affect Indian trust assets include the NGS and associated facilities, the BM&LP Railroad, the KM including the coal conveyor and associated equipment, the STS and WTS, and three communication sites.

The Hopi Tribe is a federally recognized Indian tribe whose reservation was established in 1882 by EO. The original reservation covered 2.5 million acres in Arizona. Today, the Hopi Reservation occupies 1.5 million acres including Moenkopi. Moenkopi is a 97-square-mile portion of the Hopi Reservation separated from and located west of the main reservation. Both the main reservation and Moenkopi are surrounded by the Navajo Reservation. The assets potentially affected by the Proposed Action include water rights, land, minerals, and traditional land use. The project components that may affect Hopi Indian trust assets include the portion of the KM Permit Area located on the Hopi Reservation, and use of N-Aquifer water for mining purposes.

The Indian trust asset assessment for the CAP focuses on water rights held by tribes that have received CAP water allocations through water settlements, which are held in trust by the federal government. These include the following CAP Tribes: Ak-Chin Indian Community, Fort McDowell Yavapai Nation, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, San Carlos Apache Tribe, Tohono O'odham Nation, and the White Mountain Apache Tribe. Three other tribes have CAP allocations: Pascua Yaqui Tribe, Yavapai-Apache Nation, and Tonto Apache Tribe. The NGS provides the power to pump water allocated to tribal CAP recipients. Market prices for coal energy directly affect the value of CAP-affected tribal water rights.

3.16.4 Environmental Consequences

3.16.4.1 No Action Alternative

3.16.4.1.1 Land

Under the No Action alternative, the NGS and the KM would cease to operate by the end of December 2017 and retirement activities would commence as described in Section 2.4. It is assumed that under the No Action alternative, the transmission systems on Navajo Tribal Trust Lands would continue to be operated and maintained for the foreseeable future as they have been historically, under a new agreement that would have to be made between the Lessees and the Nation. In the unlikely event that agreement cannot be reached between the Nation and the Lessees regarding continued operation, maintenance, and replacement of the portions of the STS and WTS that are located on Navajo Tribal Trust Lands, those portions would be decommissioned and retired by the end of December 2019.If operation continues, the impacts would be the same as under the Proposed Action.

Nation land trust assets within the study area that would be impacted under No Action include the lands covered by the Existing Lease to operate the NGS. Upon completion of retirement, the site would be restored as described in Section 2.4.1.1. Retirement of the NGS would entail compliance with all applicable laws and regulations, including restoration to appropriate non-residential use standards

(including remediation of contaminants) and EPA's Coal Combustion Residual Rule (SRP 2017d). Many of these Navajo Tribal Trust Lands have already been modified from the construction and operation of the NGS; minor short-term impacts would continue due to retirement activities until the end of 2020 at the latest. Landfills and wastewater ponds (about 644 acres in total) would be capped in place or subject to reclamation and remediation. The NGS ash landfill would be subject to 30 years of remediation and long-term monitoring, which would require a separate agreement to provide access for these activities. The extent to which traditional land use, such as hunting, gathering plants, and grazing, would be allowed by the Nation following retirement and restoration is uncertain. The lease payments to the Nation under the Existing Lease would cease in December 2018, which may be partially offset by revenues from granting access for remediation and monitoring.

KM operations would cease at about the same time as the NGS ceases operations. The coal conveyor, associated facilities, and areas that have been mined would be reclaimed pursuant to the mine permit and SMCRA requirements. PWCC would restore the land with equal or greater forage productivity than pre-mining conditions or for other approved uses including wildlife habitat and cultural plants (see Section 3.12, Land Use and Recreation for additional information on land restoration). After reclamation is determined satisfactory by OSMRE and BIA, and following the release of bonds, control of the surface use would revert to the Nation and the Hopi Tribe for traditional land uses or other leasing opportunities such as wind and solar energy.

It is assumed the STS and WTS would continue to operate across Navajo Tribal Trust Lands under a separate agreement. If implemented, this would contribute to the Nation's economy from continued lease payments and the potential to use the lands for renewable energy development. If an agreement cannot be reached, the portions of the STS and WTS on Navajo Tribal Trust Lands would be removed by 2020, releasing approximately 3,960 acres for other uses. It is assumed that grazing and other traditional land uses would be allowed after the transmission lines were retired and the lands restored, which would be a benefit. The Nation would cease to receive lease payments if the transmission systems were retired. If operation continues, the impacts would be the same as under the Proposed Action.

3.16.4.1.2 Water

Under the No Action alternative, the NGS would cease operations by the end of December 2017. Pumping of Colorado River water from Lake Powell for NGS operations would be reduced to about 1,500 AFA to meet retirement water needs. The Nation has indicated it will claim Colorado River surface water as part of any future proceedings. Additional information relevant to water resources is found in Section 3.8.

PWCC pumping of groundwater from the N-Aquifer at the KM also would be reduced from about 1,236 AFA to about 500 AFA beginning in 2018 to meet restoration and reclamation water needs. The N-Aquifer wells would be transferred to the Nation for local use after retirement activities at the KM have been completed. The discontinued mine pumping of groundwater would result in partial recovery of the N-Aquifer beneath the KM over time. Discontinued groundwater pumping for mine purposes at the KM would result in the loss of revenues to the Nation and the Hopi for N-Aquifer water use (see Section 3.15, Socioeconomics and Environmental Justice).

Under the No Action, CAP-affected tribes would have lower costs for delivery of CAP water assuming natural gas prices remain low. There would be an indirect benefit of about $27/AF beginning in 2018 (CAWCD 2017; see Section 3.15 for socioeconomic effects on CAP-affected tribes from the No Action alternative).

3.16.4.1.3 Grazing, Hunting, and Gathering of Natural Resources

The Nation and the Hopi have rights to continue hunting and gathering, grazing, and other traditional land uses on their respective tribal trust lands except in specific areas leased for the NGS and mining purposes.

Grazing permit holders whose lands at the KM are leased currently are compensated for loss of use, with payments made every 5 years. Under the No Action alternative, no further lands would be mined at the KM, and reclaimed lands would eventually become available again for livestock grazing, hunting, and gathering of plants and other natural resources, which would constitute a long-term beneficial effect on traditional land use (see Section 3.12 for a list of culturally important plant species).

At the NGS, it is anticipated that the Nation would permanently restrict traditional land use on about 644 acres over the capped landfills and ponds. It is unclear whether traditional land use would be restored in other areas of the NGS reclaimed lands without further remediation.

Regardless of whether the STS and WTS continue to be operated and maintained or retired by 2020, hunting and gathering, grazing, and other traditional land uses would continue in the ROW. However, more land would be available for traditional or other land uses once the transmission systems have been removed and the land restored.

3.16.4.1.4 Minerals

The mining of coal would be discontinued under the No Action alternative. No other extractable minerals are present near the NGS or the KM. The rights to minerals would be retained by the Nation and the Hopi under the No Action alternative for future use. Discontinued mining at the KM would constitute a long-term economic adverse effect from the loss of coal royalty payments (see Section 3.15, Socioeconomics and Environmental Justice). Coal royalty payments in the tens of millions would be lost 2 years early under the No Action alternative (see Section 3.13 for a discussion of royalty income).

3.16.4.2 Proposed Action

Under the Proposed Action, the NGS and associated facilities and the KM would continue operations until December 22, 2019. The existing STS and WTS would continue to be operated and maintained for 35 years until the end of the Extension Lease term in 2054. Subsequently, there would be an automatic one-time extension option—either for 2 years to allow for retirement and restoration of the two transmission systems, or for an additional 35 years of operation and retirement and restoration at the end of that period.

3.16.4.2.1 Land

Nation land trust assets within the study area that would be impacted under the Proposed Action include about 3,507 acres under the Extension Lease for the NGS and associated facilities to continue operations for 2 years until December 22, 2019. The Lessees are responsible for developing a Retirement Plan consistent with the Retirement Guidelines (SRP 2017c) with retirement activities completed within 5 years or by December 22, 2024.

Upon completion of retirement, lands would be restored where the surface of any leased land has been modified or improved, as required by the Retirement Guidelines (SRP 2017c) under the Extension Lease. Retirement of the NGS would follow applicable federal law (with respect to cleanup for non-residential uses only), the Extension Lease, and best industry practices, in that order of priority. These Navajo Tribal Trust Lands have already been modified from the construction and operation of the NGS; short-term impacts would continue due to retirement activities until the end of 2024 at the latest. About 644 acres of ash (CCR) disposal and solid waste landfills and wastewater ponds would be capped in place and subject to reclamation and remediation. These capped landfills and ponds would be permanent features of the NGS landscape after reclamation and would be subject to 30 years of remediation and long-term monitoring. Permanent Restrictive Covenants on about 644 acres would constitute a long-term adverse impact on Navajo Tribal Trust Land assets.

Per the Extension Lease, NGS closure and retirement activities would not restore the land for residential and commercial land use without further remediation by the Nation. It is unclear whether traditional land use, such as hunting, gathering plants, and grazing, would be allowed in areas not covered by the Restrictive Covenants.

KM mining operations would cease at about the same time as the NGS ceases operations near the end of 2019. The coal conveyor and associated facilities, and areas that have been mined but not already reclaimed, would be reclaimed pursuant to the approved mine permit and SMCRA regulations. PWCC would restore the land to equal or greater forage productivity than pre-mining conditions or for other approved uses including wildlife habitat and cultural plants (see Section 3.12 for additional information on land restoration). After reclamation is determined satisfactory by OSMRE and BIA, and following the release of bonds, control of the surface use would revert to the Nation and the Hopi Tribe for other leasing opportunities such as wind and solar energy or traditional land uses. Monitoring of the final areas of reclaimed land is expected to take at least 10 years before bond release.

Under the Proposed Action, the STS and WTS would continue to operate and be maintained for the 35-year Extension Lease followed by an option for a 2-year extension for decommissioning or a 35-year extension for continued operation and decommissioning. The additional lease payments for about 3,960 acres would contribute to the Nation's economy. The Nation would receive 500 MW of combined use and capacity from the STS and WTS from Reclamation; the first 10 years of O&M costs would be paid by the Lessees, after which the Nation would assume responsibility. The availability of transmission capacity would provide opportunities for renewable energy development along the transmission corridors on Navajo Tribal Trust Lands and provide long-term beneficial economic effects. When the STS and WTS are retired, the effects under the Proposed Action would be the same as under the No Action alternative.

The loss of lease and other payments by SRP for the NGS, and loss of coal royalty payments to the Nation and Hopi Tribe for the KM, would result in the loss of tens of millions of dollars of annual income (see Section 3.15.4.1.1, Socioeconomic Economic Consequences, No Action). In comparison to the No Action alternative, the Proposed Action would continue lease and coal royalty payments for 2 years, providing a short-term beneficial economic effect.

3.16.4.2.2 Water

Under the Proposed Action, effects on tribal trust water assets would be similar to the effects under the No Action alternative, except that water would continue to be drawn from Lake Powell for the NGS and pumped from the N-Aquifer for the KM for an additional 2 years. Upon NGS retirement and the cessation of mining at the KM, water use from Lake Powell and from the N-Aquifer would be substantially reduced to meet retirement and reclamation needs. Reduced water consumption at the KM would provide a long-term beneficial effect to the tribal trust assets from N-Aquifer recovery, but would also constitute a long-term adverse economic effect from the loss of revenue. Similar to the No Action alternative, the use of the N-Aquifer wells would revert back to the tribe where the well is located. The water at NGS would remain as part of Arizona's allocation of the Upper Basin water subject to any of the Nation's water rights claims.

Under the Proposed Action, CAP-affected tribes would continue to pay about $27/AF more for NGS energy to pump water for 2 years, assuming natural gas prices remain low. After NGS closure, the effect from the Proposed Action would be the same as the No Action (see Section 3.15 for socioeconomic effects on CAP-affected tribes from the Proposed Action).

3.16.4.2.3 Grazing, Hunting, and Gathering of Natural Resources

The effects on traditional land use under the Proposed Action are much the same as those under the No Action alternative, except that the return of restored and reclaimed lands would be delayed for 2 years at the NGS and the KM and for 35 years or more along the STS and WTS. To the extent that grazing and other traditional land uses are allowed after NGS retirement and KM reclamation, the Proposed Action

would have a short-term adverse effect on traditional land use but a long-term beneficial effect after reclamation and remediation are completed.

3.16.4.2.4 Minerals

The effect on minerals under the Proposed Action is the same as the effect under the No Action alternative, except that coal royalty payments would continue for 2 years. The Proposed Action would have a short-term beneficial economic effect from Nation and Hopi Tribe mineral assets in comparison to the No Action alternative, but it would also constitute a long-term adverse economic effect from the permanent loss of coal royalty payments following the cessation of mining (see Section 3.13 for more information on socioeconomics).

3.16.5 Cumulative Effects

The cumulative effects analysis area for Indian trust assets is the Navajo and Hopi reservations. Past, present, and reasonably foreseeable future actions that may intersect with Proposed Action effects on Indian trust assets are described in Section 3.2. These actions include:

- Continued operation of the Four Corners and San Juan power plants
- Past, present, and future N-Aquifer pumping by communities
- Historical mining, reclamation, and N-Aquifer pumping by PWCC
- Ranching and agriculture in and near the NGS leased lands and the KM Permit Area
- Downstream tribal surface water diversions and retention structures for livestock watering and agricultural production
- Hopi Arsenic Mitigation Project

The cumulative effects of past and present surface water diversions and depletions from the San Juan River by the Four Corners and San Juan power plants, when combined with NGS water use for 2 more years, are anticipated to have less than a 1 percent adverse effect on the availability of surface water to the Nation. The cumulative impact of past, present, and future PWCC and tribal community pumping would be an improvement of N-Aquifer water levels in the Black Mesa Basin due to reduced water use. Past, present, and reasonably foreseeable future impacts on surface water quantity and quality in the KM Permit Area washes and ponds from PWCC mining and reclamation and tribal ranching and agriculture would be negligible. See Section 3.8.5.1 for more information on the cumulative effects of the Proposed Action on water resources.

In terms of land and minerals, operation of the Four Corners Generating Station (FCGS) would continue to generate revenue from Nation trust assets, cushioning the loss of revenue from NGS and KM closure in the long term. The Nation receives lease payments from APS for the FCGS and owns the Navajo Mine that supplies coal to the FCGS. The cumulative loss of revenue from the NGS and the KM and, ultimately, revenue from the FCGS and Navajo Mine would have long-term adverse economic effects. Aside from the Kayenta Solar Project and the Paragon-Bisti Solar Ranch in northwest New Mexico, there are currently no reasonably foreseeable alternative energy or other economic development projects proposed for Nation or Hopi tribal trust lands that would replace lost revenues in the short-term. The Kayenta Solar Project became operational in 2017; the Paragon-Bisti project is in the pre-construction phase.

The Hopi Arsenic Project, if implemented, would draw water from the N-aquifer reducing the beneficial effect from the cessation of pumping water from the N-aquifer by KM.

Chapter 4. Regulatory Guidance, Laws, and Directives

This section presents a summary of selected federal laws, regulations, and EOs considered in preparation of this EA.

4.1 National Environmental Policy Act of 1969, as amended (P.L. 91-190)

This law requires federal agencies to evaluate the potential environmental consequences of major federal actions. NEPA also requires public disclosure about the Proposed Action, accompanying alternatives, impacts, and mitigation. Public and agency scoping was initiated on May 23, 2017. Additional details on the scoping process are available in Section 1.5. Reclamation and BIA solicited public comments on the NGS Extension Lease EA and draft FONSIs from October 5 through November 3, 2017. All comments were carefully considered; corrections and clarifications have been made where appropriate. Submitted comments are provided in Appendix 6 to this EA, as well as Reclamation and BIA responses to relevant substantive comments received. This EA was prepared in accordance with NEPA requirements.

4.2 Endangered Species Act of 1973 (ESA) (P.L. 93-205)

The ESA provides protection for plants and animals that are currently in danger of extinction (endangered) and those that may become extinct in the foreseeable future (threatened). Section 7 of this law requires federal agencies to ensure that all federally associated activities do not have adverse impacts on the continued existence of threatened or endangered species or designated areas (critical habitat) that are important in conserving those species.

For impacts related to the Proposed Action, Reclamation has made a preliminary determination of “may affect, not likely to adversely affect” for the following federally threatened, endangered, and candidate wildlife and plant species: Mexican spotted owl, southwestern willow flycatcher, western yellow-billed cuckoo, bonytail, Colorado pikeminnow, humpback chub, razorback sucker, Brady pincushion cactus, Fickeisen plains cactus, and Welsh’s milkweed. Reclamation has made a preliminary determination of “may affect, not likely to adversely affect” designated critical habitat for the bonytail, Colorado pikeminnow, humpback chub, and razorback sucker.

Reclamation conducted an effects analysis of listed species within the project area based on 2 years of NGS and Kayenta Mine operations; 35+ years of STS and WTS operations; and NGS, STS, and WTS retirement. Reclamation made a determination of "may affect, not likely to adversely affect” for 10 federally listed species (including critical habitat for 4 of these species where applicable). Reclamation initiated informal Section 7 consultation with the USFWS on September 18, 2017. The USFWS responded with a memorandum dated October 20, 2017, indicating its concurrence with Reclamation’s determination. This concurrence is provided as Appendix 5 to this EA.

4.3 Wild and Scenic Rivers Act of 1968 (P.L. 90-542)

This law designated the initial components of the National Wild and Scenic River System and established procedures for including other rivers or reaches of rivers that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, and preserving them in a free-flowing condition. The act applies to waters designated, or eligible for designation, as wild and scenic. There are no designated wild and scenic rivers within the analysis area, including the cumulative effects analysis area that would be affected by the Proposed Action.

4.4 Wilderness Act of 1964 (P.L. 88-577, as amended)

This law established the National Wilderness Preservation System to preserve certain federal lands (Wilderness Areas) for the public purposes of recreation, scenic, scientific, educational, conservation, and historical use by current and future generations of the American people. No wilderness areas within the analysis area would be affected by the Proposed Action as there would be no ground disturbances within wilderness areas. The Regional Haze Rule (1977, amended in 1990) under the Clean Air Act (see Section 4.6), addresses regional haze in wilderness areas.

4.5 Clean Water Act (CWA) (P.L. 92-500, as amended)

This law establishes the basic structure for regulating discharges of pollutants into the nation's rivers, lakes, estuaries, and coastal waters. Under Section 404 of the CWA, the U.S. Army Corps of Engineers (Corps) regulates the discharge of dredged and/or fill material into waters of the U.S. including wetlands. If waters of the U.S. might be affected by retirement activities or NGS operations under the Proposed Action, a delineation of waters of the U.S. and application(s) for 404 permit(s) would be submitted to the Corps, as necessary.

4.6 Clean Air Act (CAA) (P.L. 91-604, as amended)

The Clean Air Act (CAA) requires establishment of National Ambient Air Quality Standards (NAAQS) for seven criteria air pollutants across the U.S., including primary standards to protect the health of the citizens and secondary standards to protect other welfare-related values. The CAA requires existing and proposed emission sources to demonstrate compliance with those standards. While some states adopt air quality standards that are more stringent than the NAAQS, the NGS and the KM are subject to federal statutes and regulations.

On December 16, 2011, EPA issued the final Mercury and Air Toxics Standards (MATS) and Utility National Emission Standards for Hazardous Air Pollutants (NESHAP), which were published in the Federal Register on February 16, 2012 (77 FR 9304).

The Prevention of Significant Deterioration (PSD) regulations (40 CFR Part 51.166 and 40 CFR Part 52.21) provide the overall air quality regulatory framework for the permitted operations of the NGS and the KM.

In 1999 EPA promulgated the Regional Haze Rule, which requires states or tribes to submit implementation plans every 10 years that demonstrate long-term emission reduction strategies to improve visibility in Class I national parks and wilderness areas.

Promulgated as 40 CFR Part 63 Subpart UUUUU – National Emission Standards for Hazardous Air Pollutants for Coal- and Oil-Fired Electric Utility Steam Generating Units, the MATS establishes emission limitations and work practice standards for HAPs emitted from coal- and oil-fired electric utility steam generating units along with requirements to demonstrate initial and continuing compliance with the HAP emission limits.

4.7 National Historic Preservation Act (NHPA) (P.L. 89-665, as amended by P.L. 96-515)

The NHPA protects buildings, sites, districts, structures, and objects that have significant scientific, historic, or cultural value. The act established affirmative responsibilities of federal agencies to preserve historic and prehistoric resources. Effects on properties that are listed on, or that are eligible for listing on, the National Register must be taken into account in planning and operations. Any property that may

qualify for listing on the National Register must not be inadvertently transferred, sold, demolished, substantially altered, or allowed to deteriorate.

Section 306108 (formerly Section 106) of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties. The Advisory Council on Historic Preservation (ACHP) is then afforded a reasonable opportunity to comment. The historic preservation review process is outlined in regulations issued by the ACHP. Revised regulations, known as "Protection of Historic Properties" (36 CFR Part 800), were updated on August 5, 2004.

Ongoing NGS operations would not result in any new land-disturbing activities. Reclamation and BIA have initiated consultation with the Navajo Nation THPO concerning on-the-ground retirement activities at the NGS site. Once areas that are anticipated to be disturbed by retirement activities have been identified through the process described in the Extension Lease, a Class III survey would be undertaken as part of the Section 106 consultation, prior to any land-disturbing activities. The Section 106 consultation would involve coordination with other interested tribes including, but not limited to, the Hopi Tribe and Pueblo of Zuni. Retirement activities that cannot avoid historic properties would be evaluated for project effects prior to any land-disturbing activities, and any adverse effects would be resolved under a memorandum of agreement among the lead federal agencies, the Navajo Nation, SRP, and appropriate consultation parties.

Routine O&M of the transmission systems over the life of the Extension Lease will mirror existing O&M activities. If actions exceed current O&M activity types, or affect access roads that have not been previously surveyed, then the process outlined in Section 106 of the NHPA will be followed. When retirement of the transmission systems is considered, Reclamation will then determine if there is a federal undertaking and whether it has an action to take.

4.8 Farmland Protection Policy Act (P.L. 97-98)

This law requires identification of proposed actions that would adversely affect any lands classified as prime and unique farmlands to minimize the unnecessary and irreversible conversion of farmland to nonagricultural uses. The U.S. Department of Agriculture's Natural Resources and Conservation Service administers this law. No ground disturbance would occur under the Proposed Action with the exception of disturbance associated with retirement activities (e.g., building and structure demolition); any disturbances would occur in areas previously disturbed, nonagricultural lands.

4.9 EO 11988 (Floodplain Management)

This presidential directive encourages federal agencies to avoid, if reasonable alternatives exist, the short- and long-term adverse impacts associated with floodplain development. Federal agencies are required to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains in carrying out agency responsibility. No ground disturbance would occur in floodplains under the Proposed Action.

4.10 EO 12898 (Environmental Justice)

EO 12898 requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of federal actions on minority populations and low-income populations. As noted in Section 3.5, Environmental Justice, the Proposed Action and alternatives involve activities on tribal lands within the external boundaries of the Nation and Hopi Reservation. Within the analysis area, Native Americans and other racial and ethnic minorities comprised 97.9 percent of all residents on the Nation and 97.5 percent of all residents on the Hopi Reservation. The resident population

of the Nation and Hopi Tribe includes sufficient numbers of minority and low-income residents to warrant consideration under the environmental justice guidelines of EO 12898.

4.11 EO 11990 (Wetlands)

EO 11990 requires federal agencies, in carrying out their land management responsibilities, to take action that would minimize the destruction, loss, or degradation of wetlands and take action to preserve and enhance the natural and beneficial values of wetlands. No wetlands are anticipated to be affected by the Proposed Action. If waters of the U.S. might be affected by retirement activities or NGS operations under the Proposed Action, a delineation of waters of the U.S. and application(s) for 404 permit(s) would be submitted to the Corps, as necessary.

4.12 Department of the Interior, Secretarial Order, Indian Trust Assets

Indian trust assets are legal interests in assets held in trust by the U.S. government for Native American tribes or individual Native Americans. These assets can be real property or intangible rights including lands, minerals, water rights, hunting rights, other natural resources, and money. The trust responsibility requires that all federal agencies take actions reasonably necessary to protect Indian trust assets.

The Secretary of the Interior must approve actions involving and affecting Indian trust assets. The Secretary has delegated that responsibility to BIA (Reclamation 1994). BIA has authority over ROWs on Indian lands according to 25 CFR Part 169 including subpart 112 (monetary compensation for ROW over or across Indian land); over leasing on Indian land for housing, economic development, and other purposes according to 25 CFR Part 162; and over leasing of tribal and allotted lands for mineral development according to 25 CFR Parts 211 and 212. BIA also enforces reclamation on lands mined prior to the passage of SMCRA.

Chapter 5. List of Preparers and Contributors

5.1 Agencies and Entities Consulted

5.1.1 Federal

Advisory Council on Historic Preservation
Bureau of Land Management
National Park Service
U.S. Army Corps of Engineers
U.S. Department of the Interior
U.S. Department of Justice
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey

5.1.2 State

Arizona Department of Environmental Quality
Arizona Department of Water Resources
Arizona Department of Transportation
Arizona Game and Fish Department
Arizona State Forestry Division
Arizona State Land Department
Arizona State Senate
State Historic Preservation Office, Arizona State Parks

5.1.3 County

Navajo County
Coconino County
Apache County
Pima County
County of Yavapai

5.1.4 Public Involvement Process

Reclamation and BIA released the EA and Draft FONSI on October 5, 2017 for the public to review and comment during a 30-day period, ending on November 3, 2017. Public and agency comments were received on the EA and revisions were made to the EA, as appropriate. A comment summary and response to comments is in Appendix 6.

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Chapter 7. Appendices

No changes to Appendices 1-4 have been made

Appendix 5 and Appendix 6 were added to the November 2017 EA

APPENDIX 1: PUBLIC SCOPING SUMMARY REPORT

Consultants in Natural Resources and the Environment

Public Scoping Comment Summary Report
Navajo Generating Station
Extension Lease Environmental Assessment

Prepared for—

U.S. Department of the Interior
Bureau of Reclamation and
Bureau of Indian Affairs

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July 2017

Contents

1.0 Introduction 1
1.1 Background 1
1.2 Proposed Action and No Action 2
2.0 Public Scoping Notice and Public Outreach 3
3.0 Scoping Results 3
3.1 Comments Received 3
3.2 Methods for Comment Collection and Analysis 4
3.3 Scoping Issues 4
3.3.1 NEPA Process 4
3.3.2 Scoping Process and Scope of the Analysis 5
3.3.3 Purpose and Need 7
3.3.4 Retirement Plan 8
3.3.5 Proposed Action and Alternatives 8
3.3.6 Data Sources 10
3.3.7 Air Quality 10
3.3.8 Climate Change 10
3.3.9 Coal Production 11
3.3.10 Water Resources 11
3.3.11 Native American Traditional Values 12
3.3.12 Socioeconomics 13
3.3.13 Environmental Justice 15
3.3.14 Visual Resources 16
3.3.15 Coal Combustion and Hazardous Waste 16
3.3.16 Cumulative Impacts 17
3.3.17 Mitigation 17
3.3.18 Issues Outside the Scope of the EA 18

Tables

Table 1. Commenter Type or Affiliation 3
Table 2. Commenter Location by State 4

Appendices

Appendix A Scoping Memorandum
Appendix B Scoping Press Release
Appendix C Scoping Comment Letters
Appendix D Content Analysis Codes

Public Scoping Comment Summary Report
Navajo Generating Station Extension Lease
Environmental Assessment

July 2017

1.0 Introduction

Scoping, as defined in the implementing regulations for the National Environmental Policy Act of 1969, as amended (NEPA), is "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to the proposed action" (40 CFR Part 1501.7). The U.S. Department of the Interior Bureau of Reclamation (Reclamation) and Bureau of Indian Affairs (BIA), also referred to as "the agencies," are preparing an Environmental Assessment (EA) to evaluate the potential environmental effects of proposed federal actions to extend the time available to retire the Navajo Generating Station and related facilities (NGS) under an extension lease and related agreements (Extension Lease – previously referred to as the "Replacement Lease" in the Public Scoping Notice). The EA will evaluate the potential effects of two alternatives – the Proposed Action, which involves executing the Extension Lease, and no action. The EA will be prepared in compliance with NEPA requirements (Public Law 91-190), Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and United States (U.S.) Department of the Interior (USDI) regulations implementing NEPA (43 CFR Part 46).

This report provides a summary of the following:

- Efforts made to notify interested agencies, organizations, and individuals about the proposed project;
- Major points made in public comments received during the scoping process; and
- Relevant issues and concerns identified during scoping that will be addressed in the EA.

This report also briefly addresses comments that were considered to be beyond the scope of, or not applicable to, the Proposed Action.

1.1 Background

The NGS is a three-unit 2,250 megawatt coal-fired power plant located on tribal trust lands leased from the Navajo Nation (Nation) near Page, Arizona. Salt River Project Agricultural Improvement and Power District (SRP) is the operating agent for NGS and holds and manages a 42.9 percent ownership interest on its own behalf. SRP also holds a 24.3 percent interest in NGS' power and energy, which is managed by Reclamation for the use and benefit of the U.S. SRP's 24.3 percent share is primarily used to supply the power and energy for operating the Central Arizona Project (CAP). The CAP is a federal Reclamation project that pumps approximately 1.5 million acre-feet of Colorado River water annually, from Lake Havasu to central and southern Arizona.

SRP, Los Angeles Department of Water and Power (LADWP; no ownership share), Arizona Public Service (APS; 14.0 percent), Nevada Power Company d/b/a NV Energy (11.3 percent), and Tucson Electric Power Company (TEP; 7.5 percent) are the "NGS Co-tenants", also known as the "Lessees." With Reclamation, the six entities are collectively referred to as the "NGS Participants."

The plant operates pursuant to the "Navajo Project Indenture of Lease" (1969 Lease), which expires on December 22, 2019, and allows up to one additional year for retirement (until December 22, 2020). In February 2017, the non-Federal NGS Participants (utility owners known as the Lessees) announced they no longer intend to operate NGS after December 2019. The 1969 Lease generally requires the retirement[1] of certain NGS facilities after operations end. The Lessees expect that retirement activities will require two or more years to complete.

At the time the scoping notice was distributed to the public, the NGS Lessees were engaged in discussions with the Nation to develop land use arrangements that would allow NGS operations to continue through December 2019, and have retirement activities begin in 2020. Without such an agreement, NGS would need to stop generating electricity by the end of December 2017 so that retirement could be completed before December 22, 2020. The NGS Lessees and the Nation were able to come to agreement on the terms of those land use arrangements, culminating in the Nation's Council approval of the Extension Lease on June 26, 2017. President Begaye signed the Extension Lease on July 1, 2017. Several of the NGS Lessees have signed the Extension Lease as well.

1.2 Proposed Action and No Action

Under the Proposed Action, NGS would operate until the end of the Existing Lease term, December 22, 2019. The Extension Lease would commence on December 23, 2019, and provide up to 5 years for retirement of NGS and its associated facilities, and then an additional 30 years for access for remediation and long-term monitoring of the plant site and ash disposal area. The Extension Lease also would permit operation and maintenance of the Western Transmission System (WTS) and Southern Transmission System (STS) on Navajo Nation Tribal Trust Lands (Reservation Lands) for at least 35 years after 2019. These facilities provide separate utility as they transmit electrical energy from sources other than NGS. There would be an automatic one-time extension option. This option would be for either two years, to allow for retirement of the two transmission systems; or an additional 35 years of operation and subsequent retirement.

Under the No Action alternative, NGS would need to be shut down no later than January 2018 to allow sufficient time for retirement activities to be completed by the end of 2020. A separate agreement would need to be developed to enable remediation and long-term monitoring to be accomplished.

[1] "Retirement" in this document refers to all work that will occur on the NGS lease site after power generation ends, including: decommissioning, demolition, and removal of facilities, restoration of lands, post-closure monitoring, and access. Retirement does not include reclamation activities associated with the Kayenta Mine, as required by the Surface Mining Control and Reclamation Act and as detailed in the approved reclamation plan.

2.0 Public Scoping Notice and Public Outreach

On May 23, 2017, the agencies sent a scoping memorandum to the project mailing list (approximately 950 hard copy letters and 360 emails) announcing public scoping for the EA to cover proposed NGS retirement activities beginning in 2020 (see Appendix A for the scoping memorandum).

The memorandum, which was titled *Public Scoping for an Environmental Assessment Covering Navajo Generating Station Operations Through December 2019 and Retirement Activities Beginning in 2020*, was also available on Reclamation's website: https://www.usbr.gov/lc/phoenix/ and BIA's website: https://www.bia.gov/cs/groups/xregnavajo/documents/document/idc2-064424.pdf.

Reclamation issued a press release on May 25, 2017, which was posted to its website, https://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=59494, requesting public comments on the proposal (see Appendix B). Both the scoping memorandum and press release requested public comments on the possible impacts of potential Federal decisions allowing NGS to operate until the end of 2019 followed by retirement; other alternatives that should be considered to enable retirement to begin after 2019; and other concerns and issues that should be addressed in the EA. Comments were due on June 9, 2017 (although all comments received after that date also have been considered).

3.0 Scoping Results

3.1 Comments Received

Public scoping comments were submitted as emails or email attachments to NGS-EA@eroresources.com and as letters sent by fax or postal mail to the agencies' consultant, ERO Resources Corporation (ERO). Appendix C contains copies of all scoping comment letters received during the public comment period. Additional documents and attachments that were included with scoping comment letters have not been included in Appendix C, but are available in the project record. In total, 25 comments were received during (or after) the public scoping period. **Table 1** and **Table 2**, respectively, provide the affiliation and location of the commenters.

Table 1. Commenter Type or Affiliation.

Commenter Type or Affiliation	Number of Comment Submissions
Individual	14 (representing 6 individuals; one commenter submitted eight emails)
Student Group	1
Business	1
Non-governmental organizations	3 (representing 7 groups)
Tribe	6 (representing 5 tribes; 1 tribe sent two letters)
Total Comments	**25**

Table 2. Commenter Location by State.

Commenter State	Number of Comment Submissions
Arizona	16
Colorado	2
New Mexico	3
Washington DC	2
Other	2
Total Comments	**25**

3.2 Methods for Comment Collection and Analysis

Each submittal was assigned a unique identification number (e.g., S-001, S-002, etc.). Each submittal was then analyzed for content and each discrete comment was assigned an issue code and, where appropriate, a subcode (see Appendix D for the list of codes and commenter identification numbers). This content analysis allowed the agencies to extract the primary topics or issue categories from the public scoping comments. **Section 3.3, Scoping Issues** provides these issues by topic, along with representative comment excerpts.

3.3 Scoping Issues

This section provides a summary of the comments received during the public scoping period. Comments were grouped into topic categories. The summary identifies bulleted statements that indicate the range of issues raised for a given topic category. Where helpful, representative excerpts are quoted from comments to provide examples. Complete comment letters (minus attachments) are provided in Appendix C. It should be noted this summary is not intended to capture all aspects of the comments, but provides an overview of the primary themes. It also is not intended to serve as a legal record.

3.3.1 NEPA Process

Comments on the NEPA process related to the following issues:

- NEPA review should be an EIS and not an EA (note that some of the comments refer to what should be include in this “EIS”)

  (S-002, p. 1) "If, as implied in your memorandum dated May 23, 2017, this NEPA action is to address all elements associated with NGS closure and associated remediation activities, an Environmental Impact Statement (EIS) rather than an EA is required and necessary."

  (S-003 p. 3) "Before the NEPA process has even begun, the Agencies have arbitrarily presumed that an Environmental Impact Statement (“EIS”) will not be prepared for this major federal action. Instead, the Memorandum presumes only an abbreviated Environmental Assessment (“EA”) will be required."

  (S-003 p. 5) "The socio-economic implications are so significant they require analysis and mitigation in an EIS, rather than an abbreviated EA."

- Cooperating agencies

(S-004, p. 1) "Based on Zuni traditional history and our cultural and historical affiliation to the entire area encompassing the NGS and associated transmission lines, the Pueblo of Zuni requested participation, as a cooperating agency, in Reclamation's compliance processes under the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA)."

(S-008 p. 2) "[T]he Community [Gila River Indian Community] has 'special expertise' regarding the impact of the Agencies' decisions at NGS, and therefore requests cooperating agency status in connection with preparation of the NGS EA."

- Lead agencies

  (S-003 p. 3) "[T]he Office of Surface Mining should be added to the list of co-lead agencies along with the Bureau of Reclamation and Bureau of Indian Affairs"

- Consultation requirements

  (S-025, p. 6-7) "As part of the United States' broad trust obligation, the United States has a duty to consult with the Hopi Tribe. In order to fulfill its consultation obligations, the United States must provide an opportunity for meaningful consultation before any decisions are made concerning operations at NGS, including Reclamation's involvement in cessation of operations at NGS . . . In addition to consulting with the Tribe concerning socioeconomic issues, the United States should consult with the Tribe concerning at least the following issues: cultural resources, traditional cultural beliefs and values, trust assets, air quality, human health and safety, ecological health, water quantity, water quality, environmental concerns, and natural resources concerns."

  (S-025, p. 8) "Please contact the Hopi Tribe to schedule direct government-to-government meetings on this Project."

3.3.2 Scoping Process and Scope of the Analysis

Commenters provided questions related to the scoping period and provided input on the scope of the analysis that should be included in the EA:

- Extend the scoping comment period

  (S-010 p. 1) "[T]he Hopi Tribe is requesting a short extension for submitting public comments on the Scoping of the NGS Retirement Environmental Assessment . . . The Tribe is in the midst of a transition in leadership in the General Counsel's office, and requires a two week extension to finalize and submit comments—until June 23, 2017."

  (S-012 p. 1) "Please extend the comment deadline date. For Hopi people, who are busy with the start of planting season and ceremonies associated with farming, commenting on the EA is a distraction and an intrusion into their ceremonies."

- Scoping process is premature

(S-003, p. 1-2) "The scoping process is premature because a 'proposal' has yet to be presented . . . the Agencies should postpone the scoping process until a discrete proposal is identified . . . we request that the Agencies withdraw in writing its May 23, 2017 Memorandum and postpone the NEPA scoping process until a final lease and related land use agreements are fully executed by the NGS Lessees and formally approved by the Navajo Nation."

(S-012 p.1) "Wait for the dark shadow hanging over NGS to be lifted before you decide to proceed with Scoping activities. Why the rush? Who does it benefit?"

- Scope is too narrow - NEPA analysis must also include analysis of impacts related to the Kayenta Mine Complex (Kayenta and Black Mesa Mines) operations, retirement/reclamation, and alternative land uses

  (S-003 p. 3) "The coal mine is an integral component of the overall complex and cannot be segmented from the current NEPA analysis . . . Therefore, the environmental analysis must present alternatives for the coalmine, including retirement/reclamation, continued operation, or transitioning of the property to other uses."

  (S-004 p. 2)"[A] decision in favor of the lease extension by Reclamation and/or Bureau of Indian Affairs will de facto result in mining that would not occur without the lease extension. Any additional coal mining at Kayenta Mine resulting from this lease extension and potential impacts to Zuni natural and cultural resources, therefore, must also be directly considered as part of this EA."

  (S-005 p.1) "[B]ecause the NGS is the sole customer of coal produced by the nearby Kayenta Complex, continuing operation of the NGS directly impacts the ability to continue mining, reclamation, and other environmental compliance activities at the Kayenta Complex. Therefore, the scope of significant issues that should be analyzed in an environmental assessment of the NGS include the need for an orderly cessation of operations at the Kayenta Complex that provides time and resources to address the extensive environmental obligations of the mining complex that has provided coal for NGS for many decades . . . The continued operation of the NGS and its continued consumption of coal are crucial to the viability of the Kayenta Complex."

  (S-006 p. 2) "'Retirement' of the plant will result in not only the end of power generation, but also the end of demand for coal from the Kayenta Mine and the loss of the only customer of the 78-mile-long Black Mesa and Lake Powell Railroad."

- Scope is too narrow - Draft Extension Lease includes activities at the NGS site that extend years into the future and should be considered in the analysis

  (S-003 p. 8) "Since the Replacement Lease does not prohibit coal combustion at the NGS site by a future operator, the EIS must evaluate the impacts of electricity produced by continued coal combustion through at least 2045."

- Time period (December 2017 - 2019) presented by the agencies is appropriate for analysis

(S-008 p. 2) "The Community [Gila River Indian Community] agrees that the EA's analysis of the potential for NGS to continue generating electricity should be limited to the time period of December 2017 – December 2019. Any post- 2019 discussions in the EA should be limited to retirement (as defined in the Scoping Memorandum)."

3.3.3 Purpose and Need

Commenters provided the following input related to the purpose and need for the project:

- Purpose and need is not clear
  (S-004, p. 2) "[T]he 'purpose and need' statement is ambiguously defined in the 23 May 2017 scoping memorandum . . . however, public statements by Navajo Nation President Russell Begaye and Salt River Project Agricultural Improvement, and Power District (SRP) regarding the immanent closure of the NGS facility without the lease extension for NGS facility decommissioning activities suggest that coal mining at the Kayenta Mine would also cease operations within the next two months without this lease extension."

- Assumption that retirement activities can be completed in two years is incorrect
  (S-003, p. 2) "The apparent 'purpose and need' for the NEPA process is flawed . . . the Memorandum assumes that retirement activities at NGS can be completed in two years. A review of the draft Replacement Lease proves that this assumption is incorrect. The draft Replacement Lease contemplates that retirement activities will continue for 35 years after coal combustion ceases at NGS. Thus, even if NGS stopped generating electricity by December 2017, a new lease or land use agreement would still be needed to complete the remaining 33 years of retirement activities."

- Purpose and need statement should acknowledge the connection between NGS and CAP water delivery obligations established in federal Indian water settlements
  (S-008 p. 3) "The EA's purpose and need statement must reflect NGS' connection to CAP pumping water to satisfy water delivery obligations established in federal Indian water settlements. As such, the 'purpose' should include securing a 'reliable' source of power and energy that is 'continuously available,' and assuring that NGS' energy is priced so that Colorado River water delivered using CAP canals remains affordable to tribes that have settled their claims for water rights, in part, in exchange for entitlements to Colorado River water delivered to them through contracts with the Secretary."

- Fulfilling trust obligations should be considered a "need" the agencies' actions must address
  (S-008 p. 3) "[T]he Agencies must consider the trust obligations the United States has to tribes and the need to protect trust assets. With respect to the [Gila River Indian] Community, there is an express trust responsibility to protect the water rights that the Arizona Water Settlement Act (AWSA) provides to the Community. As trustees of the Community's water rights, the Agencies' decisions must consider their trust obligations, and this is therefore a need that the Agencies' actions must address."

3.3.4 Retirement Plan

Commenters requested information and clarification related to the Retirement Plan:

- "Navajo Project Retirement Guidelines" are a critical component of the Extension Lease
  (S-013 p. 1) "The Replacement Lease also contains many critical components, including the 'Navajo Project Retirement Guidelines', which provide an agreed upon framework by the Nation and the NGS Owners that describes how NGS will be retired and the NGS remediated and restored."

- NGS Retirement Plan has not been drafted or made public
  (S-003, p. 4) "[T]he Retirement Plan has yet to be drafted and has not been provided to the public. Given that the focus of this NEPA process is 'retirement activities beginning in 2020', the Retirement Plan is a crucial document needed to evaluate the scope and impacts of the project."

- Retirement Plan should be released to the public no later than the Draft EA
  (S-003, p. 4) "We request that the Agencies release the Retirement Plan prior to recommencement of scoping. In the event scoping is not postponed as requested, we request the release of the Retirement Plan no later than simultaneous with the issuance of a draft EIS (or draft EA)."

- Clarify what NGS "retirement" means and includes; specifically, whether is it defined the same in the EA Scoping Memo and the Extension Lease legislation (0194-17)
  (S-002, p. 1) "Upon termination of electricity generation at NGS, all disturbed lands should be remediated and restored to conditions that existed prior to NGS - related activities. This remediation and restoration should apply to all disturbed lands that are not directly addressed by [the Surface Mining Control and Reclamation Act] SMCRA and the Kayenta Mine Complex."

  (S-002, p.1 "Any such 'asset' at time of ceased generation that is not operating or under contract for purchase and imminent use must be considered as a land disturbance. Such land must be cleared, remediated and restored."

  (S-018, p. 9) "0194-17 defines retirement Retirement means the removal of NGS assets, excluding the Navajo Nation retained assets, and restoration of the surface of the NGS site [sic]. EA definition of retirement is different from the 0194-17 definition of retirement. Navajo Nation could theoretically take the entire plant and continue burning coal."

3.3.5 Proposed Action and Alternatives

Commenters voiced support for, and opposition to, the continued operation of the NGS. In addition to acknowledgement of the advantages/disadvantages of the Proposed Action and No Action alternatives, commenters supplied numerous suggestions on a range of alternatives to consider in the EA and asked for clarification on some alternatives:

- Clarify the "No Action Alternative" and the continued operations of CAP (regardless of alternative)

(S-008 p.3) "The 'No Action' alternative to be studied under NEPA therefore will contemplate NGS ceasing to produce energy in December 2017 and CAP procuring replacement power from another source."

(S-015 p. 1) "Most of the electricity generated by the NGS plant is utilized by the Central Arizona Project (CAP) to distribute Colorado River Water throughout the State of Arizona. Therefore, it should be assumed that the CAP will continue to operate in a similar manner after December [2019], as this water is essential to the residents and corporations in Arizona. CAP provides Colorado River Water to urban and rural areas thereby enabling users to conserve other sources of water (primarily groundwater) for future utilization."

- Alternatives to be considered are unclear

  (S-003, p. 2) "[T]he Memorandum fails to present any 'alternatives' to evaluate . . . Without any presentation of alternatives in the Memorandum, the undersigned conservation organizations are unable to provide meaningful input into a NEPA scoping process."

- Do not consider alternatives that include NGS generation of electricity beyond December 2019

- Analyze a renewable energy alternative for operations of NGS beyond 2019

  (S-001, p. 2) "We suggest that the NGS operate for two more years as was originally proposed, at a lower cost of coal from Kayenta Mine. During that time, seek out new owners along with the Federal government who are interested in alternative energy to invest in the construction of a solar (and additionally wind) generating plant. Use whatever subsidies and tax credits are at the Federal government's disposal to offset the building costs and bring in new owners."

  (S-001, p. 2) "If the transition of NGS to a sustainable, alternative energy plant is to be successful, the whole state of Arizona needs to be on board. Therefore, we think an outreach campaign should be a part of any solution. This campaign can both provide new jobs and cultural opportunities as well as inspire the next generation about the possibilities of solar and wind power in our state."

  (S-025, p. 5) "The EA should also consider whether conversion of NGS to a natural-gas fired facility is feasible."

  (S-001, p. 2) "At this point there are no resources available for the infrastructure of solar and wind generating power plants, however Arizona has immense natural resources of sun and wind that are ready to be harvested with investment in infrastructure."

  (S-007 p. 1) "I and many others have long argued for the halt of coal mining on Black Mesa that supplies NGS, and instead to transition the region to renewable energy promptly. We have already argued this from a basis of many pollution, health, and environmental and cultural heritage degradation issues. Arizona and its water supply transmission must transition to renewable energy. Local Native Americans and other citizens are willing to be part of this work force to enact the renewable energy across Arizona."

- Alternative uses of a large warehouse building on NGS site must be evaluated

  (S-003, p. 4) "The draft Replacement Lease contemplates conveyance of a large warehouse building to the Navajo Nation and the commencement of industrial activities at the site in the future. The alternative uses of the warehouse must be identified for public comment and the environmental impacts of these uses fully analyzed."

- Alternative disposal options to "closure in place" for coal combustion waste and other solid waste must be evaluated

  (S-003, p. 4) "The draft Replacement Lease contemplates abandonment of the massive coal combustion wastes and other solid wastes on site with no remediation or removal. The environmental impacts to soils, groundwaters, surface waters, and air pollution must be evaluated for this proposal and all reasonable alternatives must be considered, including removal of the waste and reclamation of the site."

  (S-003, p. 8) "[T]he EIS must evaluate alternatives to constructing an expanded coal ash landfill, including off-site disposal, recycling of the waste, and other alternatives."

- Do not consider alternatives that do not provide a reliable source of power and energy for CAP

  (S-008 p. 3) "[T]he Agencies should not carry forward and analyze any alternative that fails to provide a reliable source of power and energy for CAP to pump and deliver Colorado River water entitlements to settling tribes, provide energy that is priced to ensure that Colorado River water delivered as part of federally approved Indian water rights settlements remains affordable to such tribes, or that fails to protect trust resources."

3.3.6 Data Sources

Commenters suggested data sources for the NEPA analysis:

(S-008 p. 2) "The NGS stakeholders process has resulted in a significant amount of NGS-related data and studies both from the United States and from the non-federal stakeholders, including data and studies concerning energy costs. While some data has been somewhat speculative, the Agencies should utilize the relevant, non-speculative data from this process, including the [Gila River Indian] Community's energy cost information and the Community's and United States' Development Fund data and projections."

3.3.7 Air Quality

Commenters requested that the agencies evaluate air pollution from on-site storage or removal of coal combustion waste and solid waste from the NGS site.

3.3.8 Climate Change

Commenters requested that the agencies evaluate the impacts on global climate change resulting from the creation and release of greenhouse gases at the NGS/Kayenta Mine Complex, including social cost of carbon:

(S-003, p. 7) "[W]e request that the agencies conduct a full and complete analysis of the impacts associated with GHG emissions from the continued operation of the NGS/Kayenta complex, as well as the combined cumulative impacts caused by this source in combination with other oil and gas and coal plants in the region. We request that the agencies utilize the accepted social cost of carbon methodology in conducting this analysis. If the agencies refuse to utilize this methodology in its analysis, we request that prior to issuing a draft EIS for this project, the agencies promulgate a new methodology for assessing the impacts associated with GHG emissions for NEPA reviews. We request that this new methodology be subject to public comment and review prior to its adoption."

3.3.9 Coal Production

Commenters requested that the agencies evaluate the availability and quality of coal to be used to operate NGS through December 2019:

(S-019 p. 1) "As the draglines approach Hopi Partition Lands (HPL), the draglines have to dig deeper which means the Peabody could run out of coal by next year. EA needs to address if Peabody will have enough coal for 2018, and 2019. Coal rank has dropped down to brown coal near HPL. Coal quality needs to be measured."

3.3.10 Water Resources

Commenters asked the agencies to evaluate several topics related to water resources:

- Evaluate impacts on ground water and surface water from storage or removal of coal combustion residue (CCR) and solid waste

- Evaluate impacts on tribal water rights and federal trust obligations

  (S-003, p. 9) "The environmental impact of the use of water by the NGS Lessees during the Lease Term must be evaluated. This analysis must include the loss of use of that water by the Navajo Nation. The EIS must also evaluate the impact on the Navajo Nation's legal claim to water rights in the Upper Colorado Basin resulting from entering into the Replacement Lease. The Bureau of Indian Affairs has a trust obligation to the Navajo Nation to ensure that its' legal claims to water rights is not adversely impacted by entering into the Replacement Lease."

  (S-008 p. 2) "[T]he EA should evaluate impacts on: tribes with Colorado River entitlements pursuant to federal approved Indian water rights settlements."

  (S-008, p. 4) "In studying trust resource impacts in the EA, the Agencies must consider impacts to the [Gila River Indian] Community's water rights. The United States has an express trust responsibility to protect the water rights that the AWSA provides to the Community."

  (S-014 p. 2) "Any federal decisions related to the continued operation of NGS, whether through the end of 2019 or beyond, clearly affect the implementation of the [Tohono O'odham] Nation's water rights settlement and the United States' trust responsibility to the Nation, and therefore

must take into account the cost of power associated with the delivery of the Nation's CAP entitlement."

- Evaluate impacts related to water use from Lake Powell and associated infrastructure
  (S-003, p. 9) "The EIS must also evaluate the environmental impacts of the use of 950 acre-feet per year from Lake Powell."

  (S-004, p.2) "The water associated with Lake Powell and the pump facility is sacred to the Zuni people, and the electrical distribution lines transect our ancestral migration and ceremonial areas. As such, both actions related to the lease renewal warrant focused analysis and attention from Zuni perspectives on what the impacts of use of these facilities and infrastructure beyond 2020 by the Navajo Nation may have on Zuni natural and cultural resources."

3.3.11 Native American Traditional Values

Commenters expressed concern about impacts on Native American Traditional Values and asked that these be considered carefully in the EA:

- Be aware of potential bias in the NEPA process against tribal values
  (S-004, p. 1-2) "[T]he Pueblo of Zuni is concerned that this new EA process will be fundamentally flawed because it will be biased toward an Anglo-American, Western positivist and science-centric paradigm that will noticeably fail to give commensurate consideration and integration, quantitatively or qualitatively, of the Zuni (and other Native American) perspective and values toward the environment, values associated with the natural and cultural resources that comprise the environment, and the negative effects the proposed action(s) may have on the Zuni and other Native Americans' stewardship responsibilities toward Mother Earth."

- There is a spiritual stewardship connection to ancestral lands and environmental resources in the analysis area
  (S-004, p. 1) "[T]he geographical area under consideration in this EA is contained within Zuni ancestral lands . . . the Zuni people have maintained a spiritual stewardship connection to these important places through our recognition in the recitation of Zuni prayers and ceremonial activities. As such, these lands and their innumerable environmental resources continue to play fundamental roles in the health and wellbeing of the Zuni cultural environment and they retain intensive ongoing traditional religious and cultural importance to Zuni identity, which is founded on living Zuni cultural beliefs and practices."

- Consider and incorporate the breadth and complexity of the human-environment relationship
  (S-004, p. 2) "[I]t is vital that Reclamation and the Bureau of Indian Affairs recognize and respectfully consider and incorporate the breadth and complexity of the Zuni human-environment relationship, its underlying philosophical doctrines and principles and associated concerns as an integral part of the NEPA process, including NEPA requirements to identify, assess, and evaluate significant impacts to natural and cultural resources in the entire project area covered by this EA, including associated transmission lines."

3.3.12 Socioeconomics

Comments included requests that the Socioeconomics section of the EA analyze the following issues for all alternatives:

General Concerns

- Evaluate property devaluation associated with Extension Lease land use restrictions

Native Populations

- Evaluate Native population's socioeconomics benefits and costs/concerns (i.e., tribal economic benefit, contractual obligations, tribal employment, etc.) related to operations and retirement of the NGS Plant and Kayenta Mine Complex

  (S-001, p. 1) "We know that economically coal can't compete with natural gas prices, and coal is not a sustainable energy resource for the future of our energy needs. However, if we close the NGS early, Navajo and Hopi Nations won't have time to find a way to replace the jobs, income, or energy generated from the plant."

  (S-003, p. 5) "Reclamation is now proposing to retire the NGS plant before 2020. Reclamation's proposal will have enormous socio-economic impact on both the Navajo Nation and Hopi tribe."

  (S-013 p. 1) "The Nation [the Navajo Nation] currently has an estimated unemployment rate of 52%. The jobs at NGS and the Kayenta Mine are generally high-skilled and high-paid jobs. These jobs are irreplaceable. The Nation's government also receives significant revenue from NOS and the Kayenta Mine. Without this revenue, all 110 Chapters of the Navajo Nation will be negatively in1pacted when NOS shuts down."

  (S-013 p. 1-2)"The Replacement Lease also contains economic incentives for the [Navajo] Nation that will assist the Nation in transition its economy if NGS does shut down in December 2019. These incentives include monetary compensation to the Nation's government, NGS assets that may be retained by the Nation to use for economic development, along with access to the NGS transmission systems, which would allow the Nation to develop renewable energy projects on our lands."

  (S-025, p. 1-2) "The Navajo Generating Station ('NGS') and the associated Kayenta Mine Complex ('KMC') form the pillar of the Hopi economy and provide financial support for critical government functions for the Hopi Tribe and its members. . . The economic importance of NGS and the associated Kayenta Mine Complex ('KMC') to the Hopi Tribe cannot be overstated, as both are crucial to the Hopi Tribe's economy and government services provided by the Tribe to its members. Accordingly, in preparing the EA, the Hopi Tribe requests that the United States, as trustee for the Hopi Tribe, consider the economic impacts that its actions may have on the Hopi Tribe and take proactive steps to plan for any economic disruption. "

- Evaluate the financial impact of the future operations and maintenance of the transmission lines on the Nation

- Evaluate the financial impact resulting from tax waivers on the Nation

- Evaluate financial impacts of waiving rights to regulate

  (S-003, p. 10) "The Replacement Lease requires the Navajo Nation to waive its right to regulate the NGS Lessees during the Lease Term and throughout the following 35+ years of remediation and oversight. The financial implications of this waiver must be analyzed in the EIS, including inability to mandate hiring of Navajo workers, lost permitting fees, loss of potential Navajo Nation government jobs related to regulation of the site, and other financial implications."

  (S-018, p. 1) "No regulation of NGS Partners is not acceptable. Other power plants off the reservation get regulated."

- Evaluate and disclose tribal trust obligations

  (S-003, p. 4) "The federal government also has a federal trust relationship with both the Navajo Nation and Hopi tribe. The Bureau of Indian Affairs must ensure that the federal government's trust obligations are completely fulfilled. These trust responsibilities are separate and supplemental to its contractual obligations."

  (S-003, p. 5)"The EIS must identify all of the federal government's socio-economic trust obligations owed to the Navajo Nation and Hopi tribe and produce the documents containing these obligations."

  (S-025, p. 1) "As part of the broad trust obligations the United States owes to the Hopi Tribe, the United States must ensure the Hopi Tribe's interests are protected and support is provided to the Tribe to prevent any short-term or long-term economic disruption to the Hopi Tribe."

- Evaluate impacts of waiving tribal sovereign immunity

  (S-003, p. 10) "The Replacement Lease requires the Navajo Nation to waive its sovereign immunity. The EIS must evaluate the financial and legal implications to the Navajo Nation resulting from this waiver. The Bureau of Indian Affairs has a trust duty to the Navajo Nation to ensure its sovereign immunity is not adversely affected by entering into the Replacement Lease."

Reclamation and Financial Assurance

- Evaluate impacts associated with all remediation and reclamation allowed by the Extension Lease

- Evaluate NGS financial assurance and remediation obligations

  (S-003, p. 9) "The Replacement Lease allows each NGS Lessee to avoid posting a bond which would ensure compliance with the requirements of the Replacement Lease and future remediation. The EIS must evaluate the worst-case financial scenario associated with the breach or default of each NGS Lessee's obligations under the Replacement Lease and/or remediation obligations."

- Evaluate impacts of NGS retirement on Kayenta Mine Complex SMCRA obligations (reclamation and financial assurance)

(S-005, p. 2) "SMCRA requires that a permittee provide financial assurance such as surety bonds to support compliance with the permit obligations. The total amount of surety and other financial assurance related to the Kayenta Complex is approximately $300 million. Travelers is one of the sureties that has provided surety bonds related to the complex. The Kayenta Complex includes thousands of acres that have been disturbed during mining and are either still involved with active mining or are in status of partial reclamation that includes grading, topsoil replacement, and re-vegetation. An untimely end of operations of NGS would mean loss of revenue from coal sales to the NGS and would adversely impact Peabody's ability to complete the obligations under the leases and SMCRA."

CAP

- Evaluate impacts of NGS operations and retirement on the cost of water delivered through the CAP, particularly the cost to native peoples

  (S-008 p. 1-2) "[T]he continued generation of electricity at NGS between December 2017 and December 2019 will cause the cost of water delivered through the CAP to entitlement holders to be more expensive than if NGS operations ceased in December 2019 and replacement power (e.g., natural gas) was used to pump and deliver water through the CAP . . . the [Gila River Indian] Community will be most greatly impacted by increased energy costs resulting from NGS continuing to generate energy for CAP pumping (as compared to securing less expensive CAP replacement power) through 2019."

  (S-014 p. 2) "[B]efore any decision is made on the retirement of NGS it is important for the federal government to consider the cost-effectiveness of power delivery to NGS beneficiaries. As you know, the Southern Arizona Water Rights Settlement Act of 1982, as amended in 2004, allocates 66,000 acre-feet of Central Arizona Project (CAP) water per year to the Nation. The Department contracts to deliver this settlement water to the Nation through CAP pumping facilities that currently are powered by NGS and paid for in part with funds held in trust for the Nation."

- Evaluate impacts of NGS operations and retirement on revenue generated for the Lower Colorado River Basin Development Fund

  (S-008 p. 1-2) "[C]hanges in operations at NGS could affect the amount of revenue generated for the Lower Colorado River Basin Development Fund (Development Fund), which defrays the [Gila River Indian] Community's cost of obtaining and using its entitlement to Colorado River water. As such, the Community has a very significant interest in the NGS EA process and the outcome of Agencies' decision-making regarding NGS."

3.3.13 Environmental Justice

Comments related to environmental justice included the following:

- Evaluate direct, indirect, and cumulative impacts that may disproportionately affect minority groups

  (S-004, p. 2) "[T]he Pueblo of Zuni underscores the need for Reclamation and the Bureau of Indian Affairs to give adequate and good faith attention and consideration to traditional Native

American values and the resultant direct, indirect, and cumulative cultural impacts that may result from a federal undertaking on the Zuni people and other Native American traditional practitioners as minority groups who may be disproportionately affected by this Federal action. Native American perspectives and knowledge sovereignty must be respected throughout the EA process and granted equal standing with Western forms of knowledge production."

(S-005 p. 2) "The associated reduction in operations at the Kayenta Complex would reduce income to the Navajo and Hopi Nations due to loss of the lease payments and would also cause the loss of jobs for approximately 300 employees, most of which are Native Americans."

(S-008, p. 4) "[I]mpacts on the Community, which entail cultural, economic, and health ramifications on Community members and the Reservation, must be studied and considered as part of the EA process."

(S-010 p. 1) "The Hopi Tribe stands to be disproportionately impacted by the closure of NGS due to the significance of revenues directly and indirectly from NGS for the Hopi Tribe's economic wellbeing."

(S-025, p. 3) "Additionally, many Hopi people depend on free coal from Peabody to heat their homes and free water from the mine depot to fill cisterns for their homes and livestock. In an area where many homes lack electricity and/or running water, and approximately 50% of people live below the poverty line, free coal and water are critical resources. See ICF International Study."

- Evaluate impacts to agriculture on tribal lands
  (S-008, p. 4) "Any decision that results in a significant rise in water costs would make it extremely difficult, if not impossible, for the [Gila River Indian] Community to pay for its entitlement to Colorado River water, one of the primary uses of which is for Community agriculture. Farming the Community's land is of great importance for cultural, economic, and health reasons."

3.3.14 Visual Resources

Commenters requested an analysis of visual haze impacts:

(S-009) "Haze and mercury from plant are terrible."

(S-015 p. 1) "[T]he state of monitoring technology of air pollution over the Grand Canyon was inadequate to identify precisely any negative impact from the power plant smoke on the visibility."

3.3.15 Coal Combustion and Hazardous Waste

Commenters requested that the agencies evaluate impacts related to coal combustion waste:

- Evaluate "closure in place," including existing on-site soil and water contamination from CCR and solid waste disposal facilities, and develop management plans

(S-002, p. 2) "Contaminant remediation thresholds for all disturbed lands should be proposed for public review and comment as expeditiously as possible, including management plans for all contaminated soils and solid waste."

(S-003, p. 7) "The EIS must fully evaluate the existing contamination at the site caused by these waste disposal facilities and model future spread of contamination at the site."

- Evaluate impacts of constructing and operating an expanded ash (CCR) landfill
  (S-003, p. 7) "The Replacement Lease authorizes the construction of a new cell at the coal ash landfill. The environmental impacts of the construction and operation of an expanded coal ash landfill must be fully evaluated in the EIS."

- Evaluate environmental liability
  (S-003, p. 7) "The EIS must evaluate the environmental conditions of the entire NGS site at the time of surrender. A complete and thorough investigation of the property must be conducted of the soils, surface waters, groundwaters, and structures. The EIS must also evaluate the environmental liabilities caused by the NGS Lessees and being assumed by the Navajo Nation as a result of the "as is" Replacement Lease condition. A financial assessment of these liabilities must be presented in the socio-economic analysis in the EIS."

3.3.16 Cumulative Impacts

Commenters made suggestions regarding actions to be included in the cumulative effects analysis:

- Other oil and gas and coal plants in the region

- Historic and current impacts from the Kayenta Mine, Black Mesa Mine, and Lake Powell Railroad
  (S-005 p. 2) "All of these related impacts on the operations at the Kayenta Complex should be considered in the scope of the environmental assessment because they are cumulatively significant impacts."

  (S-006 p. 2) "The assessment should address concerns related to the Kayenta and Black Mesa Mines historic impacts on communities, people, and the land that were raised in scoping and comments on the DEIS."

  (S-006 p. 2) "The large geographic area affected by NGS, the Black Mesa and Lake Powell Railroad, and the extent of mining on Black Mesa, and all of the associated project components (including transmission facilities, mining facilities, roads, etc.) the Agencies should assess cumulative impacts of past, present, and future actions."

3.3.17 Mitigation

Commenters proposed potential mitigations:

- Mitigate on-site and off-site contamination from CCR and solid waste disposal facilities

- Mitigate socioeconomic impacts on tribes

  (S-025, p.5) "[T]he EA should consider mitigating actions [to offset socioeconomic impacts], including large-scale solar or wind installations on the Hopi Reservation."

  (S-025, p. 7) "[M]eaningful discussion of how to mitigate any direct and indirect short-term and long-term impacts to the Hopi Tribe from the proposed action and alternatives, and the support the United States intends on providing to the Hopi Tribe to prevent economic disruption from its decision."

3.3.18 Issues Outside the Scope of the EA

Some commenters raised issues that are outside the scope of the EA including, but not limited to, the following:

- Permit review for the KM
- Opposition to 0194-17 (Extension Lease legislation)

Appendix A Scoping Memorandum

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Region
Phoenix Area Office
6150 W. Thunderbird Road
Glendale, AZ 85306

BUREAU OF INDIAN AFFAIRS
Navajo Regional Office
P.O. Box 1060
Gallup, NM 87301

IN REPLY REFER TO:

PXAO-1500
ENV-6.00

May 23, 2017

MEMORANDUM

Subject: Public Scoping for an Environmental Assessment Covering Navajo Generating Station Operations Through December 2019 and Retirement Activities Beginning in 2020 (Action by June 9, 2017)

Dear Interested Party:

The Navajo Generating Station (NGS) is a three-unit, 2,250 megawatt (MW) coal-fired power plant located on tribal trust lands leased from the Navajo Nation (Nation) near Page, Arizona. The plant operates pursuant to the "Navajo Project Indenture of Lease" (1969 Lease), which expires in December 2019. In February 2017, the non-Federal NGS Participants (utility owners known as the Lessees) announced they no longer intend to operate NGS after December 2019. The 1969 Lease generally requires the retirement[1] of certain NGS facilities after operations end, and the Lessees expect that retirement activities will require two or more years to complete. The NGS Lessees are in ongoing discussions with the Nation for a land use arrangement to allow NGS operations to continue through December 2019, and have retirement activities begin in 2020. Without such an agreement, NGS would need to stop generating electricity by December 2017, so that retirement could be completed before the 1969 Lease expires in December 2019.

Any agreements to allow extra time for NGS retirement will likely require Federal approvals from the Department of the Interior (Department) agencies, such as the Bureau of Indian Affairs (BIA), and the Bureau of Reclamation[2] because of the Federal role in approving land use agreements on tribal trust lands, and due to the contracts that provide for the Federal share of NGS-generated electricity. These potential Federal approvals may be subject to the National

[1] "Retirement" in this document refers to all work that will occur on the NGS lease site after power generation ends, including: decommissioning, demolition, and removal of facilities, restoration of lands, post-closure monitoring, and access. Retirement does not include reclamation activities associated with the Kayenta Mine, as required by the Surface Mining Control and Reclamation Act and as detailed the approved reclamation plan.

[2] Reclamation is an NGS Participant; the Federal share of NGS power is used to meet the power requirements for operation of the Central Arizona Project, a Reclamation project that delivers Colorado River water to central and southern Arizona.

Environmental Policy Act (NEPA) process. The exact nature of any Federal approvals will depend on the agreement reached between the Nation and the Lessees, and the rights-of-way required.

PUBLIC SCOPING NOTICE FOR NGS OPERATIONS THROUGH DECEMBR 2019 AND INITIATING NGS RETIREMENT ACTIVITIES BEGINNING IN 2020

The NGS Lessees and the Nation are considering options that would allow NGS operations to continue through December 2019, and provide for retirement beginning in January 2020. Associated transmission uses also are being considered. These matters are the subject of ongoing negotiations between the Nation and the NGS operator, the Salt River Project Agricultural Improvement, and Power District (SRP). The form and terms of a potential agreement are unknown at this time. Regardless of the form and terms of a potential agreement, the current Lessees do not plan to generate coal-fired electrical energy at NGS after December 2019.

As an NGS Participant, Reclamation may need to provide written approval for any land use agreement executed by SRP pursuant to its agreements with the NGS Participants. In addition, the Secretary of the Interior or the BIA may need to approve aspects of the agreement on behalf of the Nation. It is likely that one, or both, of the Federal agencies will need to complete an Environmental Assessment (EA) regarding the pending Federal approvals related to NGS.

To aid in the development of this EA, the Department is seeking public input regarding the potential impacts of these possible Federal decisions related to the operation of NGS through the end of December 2019, followed by retirement activities, as well as input regarding alternatives that enable retirement activities to begin after December 2019, and other concerns that should be addressed in the EA. To be most helpful, comments should be as specific as possible. Please send written comments to:

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

You also may fax your comments to ERO Resources Corporation at 303-830-1199, or send your written comments by email to NGS-EA@eroresources.com. To ensure comments are considered in the preparation of the EA, they must be postmarked by the end of the scoping period on June 9, 2017.

Before including your name, address, phone number, email address, or other personal identifying information in your submittal, you should be aware that your entire comment — including your personal identifying information — may be made publicly available at any time. While you may request that we withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

RELATIONSHIP BETWEEN THIS NOTICE AND STATUS OF THE PROPOSAL TO OPERATE NGS FROM 2020 THROUGH 2044

An Environmental Impact Statement (EIS) process was started in 2013 to describe the effects of operating NGS from 2020 through the end of 2044. That EIS process analyzes the potential environmental impacts from extending the operations of NGS for 25 years after the end of the 1969 Lease term, and associated changes to the Kayenta Mine life-of-mine plan. Reclamation issued a draft EIS for public review and comment on September 30, 2016, and the review and comment period ended on December 29, 2016.

Whether NGS will continue to operate in general is uncertain because of the Lessees announcement to end NGS operations after December 2019. There is a potential NGS will continue to operate after December 2019 with new ownership. The current Lessees have indicated they are open to working with new owners to operate NGS after December 2019. If NGS ownership changes, Federal approvals for such new operations are likely to be required. Based on ownership changes, the existing EIS process will be evaluated to determine how to comply with NEPA and other statutes. Until more information about operating after December 2019 is known, the Department intends to focus its efforts on an EA for continuing NGS operations through the end of December 2019. The decisions being analyzed in this EA will not: (1) authorize coal-fired generation at NGS after December 2019; (2) authorize additional coal mining at the Kayenta Mine; or (3) limit future decisions about uses of the NGS site if the NGS facilities are retired.

We appreciate your interest in this project. If you have any questions regarding the information in this memorandum, please contact Mr. Sean M. Heath, Bureau of Reclamation Phoenix Area Office at 623-773-6250, or Ms. Harrilene Yazzie, Bureau of Indian Affairs-Navajo Region at 505-863-8287.

Sincerely,

Leslie A. Meyers
Phoenix Office Area Manager
Lower Colorado Region
Bureau of Reclamation

Sharon Pinto
Regional Director
Navajo Region
Bureau of Indian Affairs

Appendix B Scoping Press Release

News & Multimedia

Reclamation and BIA Seek Public Comments on Navajo Generating Station Operations through December 2019 and Potential Retirement Activities Post-2019

Media Contact: Dan DuBray/Reclamation, 202-513-0574

Nedra Darling/Indian Affairs, (202) 219-4152

For Release: May 25, 2017

Navajo Generating Station

PHOENIX – The Bureau of Reclamation (Reclamation) and the Bureau of Indian Affairs (BIA) are seeking public comments on a proposed action for potential Federal decisions needed to operate Navajo Generating Station (NGS) near Page, Arizona, through December 2019 and to conduct retirement activities post-2019. Operating NGS through December 2019 and conducting retirement activities post-2019 will require land use agreements that will likely require Federal approvals. Because of these potential Federal approvals, an Environmental Assessment (EA) is being prepared to help assess the effects the proposed action would have on the environment and natural resources. This information will aid in decisions regarding a land use agreement and required rights-of-way, which are the subject of current negotiations between the Navajo Nation (Nation) and the non-Federal participants (Lessees).

Land use agreement options are being considered for operating NGS through December 2019 and potentially initiating retirement of the plant in 2020. Use of existing power transmission facilities are also being considered. Without a land use agreement between the Nation and the Lessees enabling retirement and post-closure activities to begin after 2019, NGS operations

would likely cease by January 2018 and initiation of retirement activities would begin immediately. If new owners purchase NGS, those owners would need to separately pursue Federal approvals to operate NGS after December 2019.

Reclamation and BIA are seeking public input regarding: the possible impacts of potential Federal decisions allowing NGS to operate until the end of 2019 followed by retirement; other alternatives that should be considered to enable retirement to begin after 2019; and other concerns and issues that should be addressed in the EA. Please send written comments to:

NGS Operations through 2019, Retirement and Post-Closure EA
Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

You also may fax your comments to 303-830-1199 or email your written comments to NGS-EA@eroresources.com. Comments must be postmarked by the end of the scoping period on June 9, 2017 for consideration in the EA. Interested parties' names, addresses, phone numbers, email addresses or other personal identifying information included with comments may be made publicly available at any time. Requesting personal information be withheld does not guarantee that we will be able to do so.

More information on the EA is available at: https://www.usbr.gov/lc/phoenix/, or https://www.bia.gov/WhoWeAre/RegionalOffices/Navajo/index.htm.

# # #

Reclamation is the largest wholesale water supplier in the United States, and the nation's second largest producer of hydroelectric power. Its facilities also provide substantial flood control, recreation, and fish and wildlife benefits. Visit our website at https://www.usbr.gov and follow us on Twitter @USBR.

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Appendix C Scoping Comment Letters

Kinlani Bordertown Dormitory **Native American Energy Advocates**: Courtney Ben, Shayla Naswood, Misty Humeyestewa, Shania Atene, Rachel Yazzie, Kylie Dixon, and Aleesha Begay.

Advisors: Vicki Anderson and Theresa Boone-Schuler

901 North Kinlani Road
Flagstaff, AZ 86001
(928) 774-5279/5270 (Main Office)

Dear Leslie A. Meyers and Sharon Pinto,

Thank you for asking for our input! We compiled the following ideas.

Our Background

The Kinlani Bordertown Native American Energy Advocates have been studying energy and the closing of the Navajo Generating Station this year. All members are Native American High School students that live on Reservations and stay at Kinlani Bordertown Dormitory during the week to go to Flagstaff High School. For this energy project, we have received awards (Arizona School of the Year and National Special Project of the Year) and an invitation to Washington DC to attend the NEED (National Energy Education Development) Conference.

Our background allows us to see all sides of the issue of the NGS, from the economic, environmental, and personal impacts. We recognize that the NGS is a huge part of our economy, and if it began dismantling early in 2017 many of our family members would lose their jobs or be directly impacted. We also know that coal is not a clean or sustainable energy source, and we want to invest in better technology for our future. Finally, we know that our energy needs are not being met, and are increasing every day. For example, while Navajo Nation is the largest Reservation in the country, it has the highest percentage of households without electricity.

We see this discussion on the future of NGS as a great opportunity for Arizona to become a major player in cutting edge energy solutions that will sustain us for generations to come.

Why Retiring NGS Early Is a Problem

We know that economically coal can't compete with natural gas prices, and coal is not a sustainable energy resource for the future of our energy needs. However, if we close the NGS early, Navajo and Hopi Nations won't have time to find a way to replace the jobs, income, or energy generated from the plant.

The Future of Arizona Energy is in the Sun and Wind

At this point there are no resources available for the infrastructure of solar and wind generating power plants, however Arizona has immense natural resources of sun and wind that are ready to be harvested with investment in infrastructure.

How the Federal Government Can Help

We suggest that the NGS operate for two more years as was originally proposed, at a lower cost of coal from Kayenta Mine. During that time, seek out new owners along with the Federal government who are interested in alternative energy to invest in the construction of a solar (and additionally wind) generating plant. Use whatever subsidies and tax credits are at the Federal government's disposal to offset the building costs and bring in new owners. While this may be a difficult undertaking, we can study other successful examples of transitions, like the Southern Paiute Solar Project in Nevada in partnership with First Solar. The success of our transition is important not only to the future of Arizona's energy needs but also the energy policies of the entire United States.

Empowering the Future of Energy in Arizona Beyond 2019

If the transition of NGS to a sustainable, alternative energy plant is to be successful, the whole state of Arizona needs to be on board. Therefore, we think an outreach campaign should be a part of any solution. This campaign can both provide new jobs and cultural opportunities as well as inspire the next generation about the possibilities of solar and wind power in our state. These are some examples of outreach efforts:

- Incorporate NAU/UOA renewable energy education learning centers at the Alternative Energy Generating Station. It could be an educational and internship center.
- Provide an Environmental Tourist Visitor center. These can be built and operated by Native Americans.
- Establish a Native American Art and Cultural Center that can incorporate Native American Culture/Art with an environmental focus.
- Create an Alternative Energy Education Center where people can enroll and possibly learn how to set up photovoltaic solar panels and wind turbines to get electricity at their homes.

Conclusion

In conclusion, we hope that the Department of the Interior and the Federal Government will decide to work with the owners and operators of the NGS to extend the operation to 2019. This will give us the much needed time to start implementing a new business model that brings energy to the West, bring new skilled jobs to our community, and make Arizona a leader in cutting edge energy technology that provides a sustainable and environmentally friendly industry that we can be proud of in the future.

Thank you for considering our input!

Native American Energy Advocates

vickionthenet@gmail.com

May 29, 2017

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Dear Comment Reviewers,

Thank you for the opportunity to express my suggestions on the requisite environmental assessment (EA) that is likely to be precipitated by NGS owners' plans to cease electricity generation in December 2019. If, as implied in your memorandum dated May 23, 2017, this NEPA action is to address all elements associated with NGS closure and associated remediation activities, an Environmental Impact Statement (EIS) rather than an EA is required and necessary. To the extent that remediation and restoration of the Kayenta Mine Complex (KMC) are governed by SMCRA and other NEPA actions, my comments on those actions will be provided in a separate and timely manner. Following are specific elements that should be considered and addressed in this appropriate NEPA assessment.

1. Upon termination of electricity generation at NGS, all disturbed lands should be remediated and restored to conditions that existed prior to NGS - related activities.

2. This remediation and restoration should apply to all disturbed lands that are not directly addressed by SMCRA and the Kayenta Mine Complex. These include, but are not limited to,

2.1 The NGS plant site;
2.2 All associated water structures and conveyances including those beyond the immediate plant site;
2.3 All rights-of way, easements, land leases, and uses of public land associated with transmission of electricity from NGS to properties of any NGS owner or other current or former purchaser of electricity generated at NGS;
2.4 The dedicated railroad between KCS and NGS and all associated disturbances;
2.5 All lands currently or previously used for disposal of combustion waste e.g. fly ash, bottom ash, and scrubber sludge; wastewater treatment sludge; and mine wastes (as applicable).

3.0 There has been considerable information reported in the public media by many interested parties about the potential for continued operation or utilization of NGS, KMC, railroad, transmission lines, water infrastructure, etc. Any such "asset" at time of ceased generation that is not operating or under contract for purchase and imminent use must be considered as a land disturbance. Such land must be cleared, remediated and restored.

4.0 Contaminant remediation thresholds for all disturbed lands should be proposed for public review and comment as expeditiously as possible, including management plans for all contaminated soils and solid waste.

Thank you again for your consideration. If any of the above comments are unclear or require amplification, please call on me.

Sincerely,

William M. Auberle
659 N Amberwood ST
Flagstaff, AZ 86004
(928) 380-4780
wauberle@msn.com

Dine' Citizens Against Ruining the Environment * To' Nizhoni Ani * Grand Canyon Trust* Sierra Club * National Parks Conservation Association

June 9, 2017

By email: NGS-EA@eroresources.com
NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Re: Public Scoping Notice for an Environmental Assessment Covering Navajo Generating Station Operations Through December 2019 and Retirement Activities Beginning in 2020, PXAO-1500, ENV-6.00, dated May 23, 2017

To whom it may concern:

The above listed organizations submit the following comments on the Bureaus of Reclamation and Indian Affairs' ("Agencies") May 23, 2017 scoping memorandum ("Memorandum") related to the Navajo Generating Station.

1. The scoping process is premature because a "proposal" has yet to be presented.

A NEPA scoping process may only be instituted when an agency presents a "proposed action." 40 C.F.R. §1501.7. "A 'proposal' exists at that stage in the development of an action when an agency subject to the Act has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated." As discussed below, a "proposal" does not yet exist and therefore scoping is premature.

A review of the Agencies' May 23, 2017 memorandum makes clear that an agency proposal does not yet exist. For example, the memorandum states:

- "The NGS Lessees are in ongoing discussions with the Nation for a land use arrangement…" Memorandum, p. 1. There is no final signed lease agreement or land use arrangement to allow NGS operations to continue through December 2019 and therefore the effects of such an agreement cannot be meaningfully evaluated.
- "The exact nature of any Federal approvals will depend on the agreement reached between the Nation and the Lessees, and the rights-of-way required." Memorandum, p. 2. We agree. Without a final signed lease or land use agreement, the undersigned conservation organizations are unable to provide meaningful input at this time and the NEPA scoping process is premature.
- "The form and terms of a potential agreement are unknown at this time." Memorandum, p. 2. This statement is an admission by the Agencies that the NEPA scoping process is premature at this time.

From the Agencies' own admissions above, it is clear that this project has not achieved the "proposal" stage. Therefore, the Agencies should postpone the scoping process until a discrete proposal is identified.

Further, the Memorandum fails to present any "alternatives" to evaluate. The "alternatives" analysis is the heart of the NEPA process. 40 C.F.R. §1502.14. Without any presentation of alternatives in the Memorandum, the undersigned conservation organizations are unable to provide meaningful input into a NEPA scoping process.

For the reasons stated above, we request that the Agencies withdraw in writing its May 23, 2017 Memorandum and postpone the NEPA scoping process until a final lease and related land use agreements are fully executed by the NGS Lessees and formally approved by the Navajo Nation. The undersigned are unable to provide meaningful input to a NEPA process until the final terms of future NGS activities are fully defined and disclosed.

Without waiving this argument, this comment letter will rely on the draft Replacement Lease and related documents as the "proposal" for purposes of this scoping comment letter.[1] In addition, some of the undersigned groups have previously submitted scoping comment letters and comments on the 2016 draft EIS for the NGS/Kayenta mine complex. These previous comment letters are attached hereto and incorporated herein by reference.[2]

2. <u>The apparent "purpose and need" for the NEPA process is flawed.</u>

The Agencies and NGS Lessees are demanding that the Navajo Nation approve a lease extension no later than July 1, 2017. The Memorandum states that the apparent "purpose and need" for instituting this NEPA process is "NGS would need to stop generating electricity by December 2017, so that ***retirement could be completed before the 1969 Lease expires in December 2019***." Memorandum, p. 1 (emphasis added). In other words, the Memorandum assumes that retirement activities at NGS can be completed in two years. A review of the draft Replacement Lease proves that this assumption is incorrect. The draft Replacement Lease contemplates that retirement activities will continue for 35 years after coal combustion ceases at NGS. Thus, even if NGS stopped generating electricity by December 2017, a new lease or land use agreement would still be needed to complete the remaining 33 years of retirement activities. In summary, THE AGENCIES AND NGS LESSEES ARE PRESENTING THE NAVAJO NATION WITH A FALSE ULTIMATUM. There is no urgency to approve a lease extension by July 1, 2017 because retirement activities cannot be completed before the current lease expires. Alternatively, if the agencies have information that all retirement activities can be accomplished in 2 years, that information should be made available to the public for review and comment.

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[1] Attached as Exhibit 1 hereto.
[2] Attached hereto as Exhibits 2, 3, and 4 to this comment letter.

3. The Memorandum arbitrarily presumes that an EIS will not be required.

Before the NEPA process has even begun, the Agencies have arbitrarily presumed that an Environmental Impact Statement ("EIS") will not be prepared for this major federal action. Instead, the Memorandum presumes only an abbreviated Environmental Assessment ("EA") will be required. More specifically, the Memorandum states, "[i]t is likely that one, or both, of the Federal agencies will need to complete an Environmental Assessment (EA) regarding the pending Federal approvals related to NGS." Memorandum, p. 2.

The Agencies may not arbitrarily and illegally presume the extent of the environmental analysis before a final proposal is even adopted. The Agencies' Memorandum displays its clear bias toward an abbreviated environmental analysis. This bias is not only illegal, it is also factually flawed.

As noted above, the NGS/Kayenta mine complex is an expansive industrial facility including a massive coal mine and the largest coal plant east of the Mississippi River. The complex has so many environmental impacts that in 2016 the Agencies prepared a draft Environmental Impact Statement evaluating continued operation of the facility. The Draft EIS included an evaluation of both the power plant and the coalmine.

In contrast, the Memorandum attempts to arbitrarily segment this NEPA process by defining "retirement" activities to exclude "reclamation activities associated with the Kayenta Mine, as required by the Surface Mining Control and Reclamation Act and as detailed in the approved reclamation plan." Memorandum, p. 1, footnote 1. Just as with the Draft EIS, an environmental evaluation of the retirement of the NGS power plant must also include an evaluation of the Kayenta Mine/Black Mesa coal mine. The coal mine is an integral component of the overall complex and cannot be segmented from the current NEPA analysis. The NEPA regulations state, "[p]roposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement." 40 C.F.R. §1502.4(a). Therefore, the environmental analysis must present alternatives for the coalmine, including retirement/reclamation, continued operation, or transitioning of the property to other uses. Moreover, the Office of Surface Mining should be added to the list of co-lead agencies along with the Bureau of Reclamation and Bureau of Indian Affairs. As such, a full EIS is required to evaluate the impacts and alternatives associated with retirement of the complex.

Further, even if the environmental evaluation is restricted activities authorized in the draft Replacement Lease, the EIS is still required to evaluate the environmental impacts and alternatives. For example:

- The draft Replacement Lease includes activities at the NGS site that extend at least 37 years into the future.

- The draft Replacement Lease contemplates conveyance of a large warehouse building to the Navajo Nation and the commencement of industrial activities at the site in the future. The alternative uses of the warehouse must be identified for public comment and the environmental impacts of these uses fully analyzed.
- The draft Replacement Lease contemplates abandonment of the massive coal combustion wastes and other solid wastes on site with no remediation or removal. The environmental impacts to soils, groundwaters, surface waters, and air pollution must be evaluated for this proposal and all reasonable alternatives must be considered, including removal of the waste and reclamation of the site.

These are just of few of the extensive environmental impacts and remedial alternatives that must be fully evaluated in the NEPA process. When the totality of the impact is fairly identified, we expect it to become clear that a full EIS must be prepared for this project.

4. The Retirement Plan referenced in the lease has yet to be drafted.

The draft Replacement Lease references a "Retirement Plan" that will govern activities at the NGS site. However, the Retirement Plan has yet to be drafted and has not been provided to the public. Given that the focus of this NEPA process is "retirement activities beginning in 2020," the Retirement Plan is a crucial document needed to evaluate the scope and impacts of the project. We request that the Agencies release the Retirement Plan prior to recommencement of scoping. In the event scoping is not postponed as requested, we request the release of the Retirement Plan no later than simultaneous with the issuance of a draft EIS (or draft EA).

5. The socioeconomic implications of the project demand an EIS.

The Navajo Nation receives over $30 million each year in revenue from NGS operations which are about one-third of the government's budget. The power plant employs approximately 400 Navajo workers. The Kayenta mine employs hundreds of Hopi and Navajo workers and accounts for the majority of revenue to the Hopi tribe.

The NGS power plant is unique in that it is owned in part (24%) by the federal government through the federal Bureau of Reclamation. Reclamation is also in partnership with the other NGS Lessee owners of the plant. Thus, Reclamation has both direct and indirect contractual relations with the Navajo Nation. These contractual obligations impose certain duties on Reclamation.

The federal government also has a federal trust relationship with both the Navajo Nation and Hopi tribe. The Bureau of Indian Affairs must ensure that the federal government's trust obligations are completely fulfilled. These trust responsibilities are separate and supplemental to its contractual obligations.

Reclamation is now proposing to retire the NGS plant before 2020. Reclamation's proposal will have enormous socio-economic impact on both the Navajo Nation and Hopi tribe. The socio-economic implications are so significant they require analysis and mitigation in an EIS, rather than an abbreviated EA.

We request that the EIS fully evaluate the following socio-economic implications of the proposed action:

- The EIS must identify all of the federal government and NGS Lessees' existing socio-economic contractual obligations to the Navajo Nation and Hopi tribe and produce the documents containing these obligations, including but not limited to any treaties, contracts, or agreements.
- The EIS must identify all of the federal government's socio-economic trust obligations owed to the Navajo Nation and Hopi tribe and produce the documents containing these obligations.
- The EIS must evaluate and disclose the total economic benefit received by the Navajo Nation and Hopi tribe from operation of the NGS plant and Kayenta/Black Mesa Mine each year since the facility has been in operation and the cumulative benefit of total operations.
- The EIS must analyze and disclose the number of Navajo and Hopi workers employed at the power plant and mine each year the facility has been in operation and the cumulative employment benefit.
- The EIS must evaluate and disclose the total economic benefit to the Navajo Nation and Hopi tribe of the draft Replacement Lease and other related agreements each year into the future through the life of the agreement(s). The analysis should present the economic benefits each year and a cumulative benefit.
- The EIS must evaluate and disclose the total employment benefit to the Navajo Nation and Hopi tribe of the draft Replacement Lease and other related agreements each year into the future through the life of the agreement(s). The analysis should present the employment benefits each year and a cumulative benefit.
- To the extent the current and historical economic and employment benefits exceed the projected future benefits, the EIS must state how any future socio-economic losses resulting from the project will be fully mitigated by the federal government and the NGS Lessees.

6. <u>The NEPA process must evaluate impacts and alternatives authorized by the Replacement Lease</u>

The environmental impacts of the following activities authorized by the Replacement Lease will be significant and must be analyzed in an EIS:

a. Two year operation of the NGS plant and Kayenta Mine.

The Replacement Lease authorizes the continued operation of the NGS plant and Kayenta Mine.[3] These operations will have significant adverse impacts on the environment, including but not limited to contamination of the air, water, and land at the NGS/Kayenta complex. These adverse effects are further described in the attached scoping and DEIS comment letters previously submitted by some of the organizations signing this comment letter, which are incorporated herein by reference.

The EIS must also evaluate the impacts to global climate change resulting from the creation and release of greenhouse gases at the NGS/Kayenta complex. On March 28, 2017, the current administration signed Executive Order 13783 which, among other things, required the Council on Environmental Quality ("CEQ") to rescind its final guidance entitled, "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews" which is referred to in "Notice of Availability," 81 Fed. Reg. 51866 (August 5, 2016). On or about April 5, 2017, CEQ rescinded the above referenced guidance. Executive Order 13783 also withdrew technical support documents establishing the social cost of carbon as the official methodology of the government in determining climate impacts caused by GHG emissions.
While these guidance and technical documents have been rescinded and withdrawn, it does not eliminate the need for consideration of the impacts of GHG emissions in the NEPA process. Instead, the government is now simply without an accepted scientific methodology for calculating climate impacts. Thus, the government will have to adopt a new methodology for calculating climate impacts prior to issuance of an EIS for this project. On April 20, 2017 the Congressional Review Service ("CRS") reviewed Executive Order 13783 and determined that prior to the issuance of the rescinded guidance, "some courts had faulted federal agencies for insufficiently taking into account climate-related impacts of their proposed actions" in NEPA reviews.[4] The CRS concludes that "in order to comply with such rulings, federal agencies will still likely need to consider the impacts that their proposed actions would have on greenhouse gas (GHG) emissions and climate change." As to the social costs of carbon methodology, the CRS states:

> …federal agencies may still be required to take into account the costs of carbon in their rulemakings and NEPA reviews. For example, Executive Order 12866, issued in 1993, requires most agencies to consider costs and benefits of economically significant rules, including the cost of adverse effects in the 'natural environment.' The new Executive Order 13783 does not remove the requirement to consider environment-related costs and benefits associated with regulatory actions, including revisions or withdrawals of rules. In these instances, the executive order directs agencies to be consistent with the guidance in the Office

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[3] Section 2 of the Replacement Lease.

[4] See, https://fas.org/sgp/crs/misc/eo-rescind.pdf. Also, for an example of one legal decision requiring a NEPA analysis of climate change impacts see, Center for Biological Diversity v. National Highway Traffic Safety Administration, 538 F.3d 1172 (9th Cir. 2008).

of Management and Budget (OMB) Circular A-4, dated September 17, 2003, when analyzing the value of changes in GHG emissions resulting from regulations. Although the OMB Circular A-4 provides guidance on how to conduct cost-benefit analysis in rulemakings, it mentions climate change costs and benefits only once. In the circular, OMB recommends that federal agencies should analyze and present uncertainties related to its cost-benefits analysis of regulatory options, including, 'for example, the uncertain knowledge of how some economic activities might affect future climate change.' Without additional guidance, in order to comply with Executive Orders 12866 and 13783 and NEPA requirements, federal agencies will likely still need to determine how to assess the climate-related costs and benefits associated with rulemakings.

In summary, we request that the agencies conduct a full and complete analysis of the impacts associated with GHG emissions from the continued operation of the NGS/Kayenta complex, as well as the combined cumulative impacts caused by this source in combination with other oil and gas and coal plants in the region. We request that the agencies utilize the accepted social cost of carbon methodology in conducting this analysis. If the agencies refuse to utilize this methodology in its analysis, we request that prior to issuing a draft EIS for this project, the agencies promulgate a new methodology for assessing the impacts associated with GHG emissions for NEPA reviews. We request that this new methodology be subject to public comment and review prior to its adoption. The agencies simply cannot proceed with this NEPA review until a new methodology is adopted for determining impacts associated with GHG emissions.

b. Closure in place.

The Replacement Lease authorizes the abandonment of coal ash and solid waste landfills, ponds, and other waste disposal facilities that have the potential to contaminate air, water and soil in perpetuity.[5] The EIS must fully evaluate the existing contamination at the site caused by these waste disposal facilities and model future spread of contamination at the site. The EIS must also mitigate on and off site contamination resulting from these structures. Additional comments on these waste disposal facilities can be found in the attached scoping and DEIS comment letters previously submitted by some of the signatories to this letter.

c. Restriction of use.

The Replacement Lease also restricts, in perpetuity, the use of the NGS site by prohibiting future residential, educational, agricultural, and other uses of the property.[6] The socio-economic analysis of the EIS must evaluate the loss of property value associated with these land use restrictions. The EIS should also evaluate the remediation costs associated with returning the NGS property to its full use, including those currently prohibited under the Replacement Lease.

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[5] Section 4(D) of Replacement Lease.
[6] Section 4(E) of the Replacement Lease.

d. Impacts to land, air and water associated with remediation and reclamation.

The Replacement Lease allows extensive earthmoving and other activities associated with remediation and reclamation activities. Some of these activities will extend 35 years into the future and possibly beyond.[7] The environmental impacts associated with all remediation and reclamation must be analyzed in the EIS.

e. Impacts to the surrendered property from future uses.

The NGS site will be surrendered to the Navajo Nation upon completion of the Lease Term.[8] Once surrendered, the Navajo Nation may use the former-NGS site for industrial and commercial purposes not prohibited by the Replacement Lease. The Navajo Nation has expressed their interest in using the site for such purposes.[9] The environmental impacts of the future uses of the site must be evaluated in the EIS. This includes not only the NGS plant site, but also other surrendered property including but not limited to the railroad track, Lake Pump Facility, transmission lines, and the Warehouse.[10] Since the Replacement Lease does not prohibit coal combustion at the NGS site by a future operator, the EIS must evaluate the impacts of electricity produced by continued coal combustion through at least 2045. Additional comments on the continued production of coal-fired electricity at the site can be found in previous scoping and DEIS comment letters submitted by some of the signatories to this letter and are attached hereto.

f. Expansion of the coal ash landfills.

The Replacement Lease authorizes the construction of a new cell at the coal ash landfill.[11] The environmental impacts of the construction and operation of an expanded coal ash landfill must be fully evaluated in the EIS. In addition, the EIS must evaluate alternatives to constructing an expanded coal ash landfill, including off site disposal, recycling of the waste, and other alternatives.

g. The environmental condition of surrendered lands must be evaluated.

The Replacement Lease states that the Navajo Nation accepts the surrendered NGS site and retained assets in "as is" condition.[12] The NGS site has been used for over 50 years as a heavy industrial coal plant operation. Over the past 50 years there has been extensive contamination of the NGS plant site as a result of coal use, coal combustion,

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[7] Section 5(A) of the Replacement Lease.
[8] Section 6 of the Replacement Lease.
[9] Section 24(A) of the Replacement Lease.
[10] Section 7(A)(iii) of the Replacement Lease.
[11] Section 6(F) of the Replacement Lease.
[12] Sections 6(I) and 11(F) of the Replacement Lease.

hazardous materials spills, and other activities. The EIS must evaluate the environmental conditions of the entire NGS site at the time of surrender. A complete and thorough investigation of the property must be conducted of the soils, surface waters, groundwaters, and structures. The EIS must also evaluate the environmental liabilities caused by the NGS Lessees and being assumed by the Navajo Nation as a result of the "as is" Replacement Lease condition. A financial assessment of these liabilities must be presented in the socio-economic analysis in the EIS.

h. Failure to post bonds.

The Replacement Lease allows each NGS Lessee to avoid posting a bond which would ensure compliance with the requirements of the Replacement Lease and future remediation.[13] The EIS must evaluate the worst-case financial scenario associated with the breach or default of each NGS Lessee's obligations under the Replacement Lease and/or remediation obligations.

i. The costs of O & M of the transmission lines must be evaluated.

The NGS Lessees will only conduct O & M on the transmission lines for the Lease Term and §323 Grants.[14] Once those terms expire, the Navajo Nation will be financially responsible for O & M on the transmission lines. The EIS must evaluate the economic impact on the Navajo Nation of the future O & M of the transmission lines.

j. The loss of Navajo Nation tax revenue must be evaluated.

The payments made by the NGS Lessees under the Replacement Lease are in lieu of taxes that could be imposed by the Navajo Nation government.[15] The EIS must evaluate the financial impact to the Navajo Nation resulting from the waiver of its right to impose taxes and other fees on the NGS Lessees resulting from the Replacement Lease.

k. The impact of water use during and after the lease must be evaluated.

The environmental impact of the use of water by the NGS Lessees during the Lease Term must be evaluated.[16] This analysis must include the loss of use of that water by the Navajo Nation. The EIS must also evaluate the impact on the Navajo Nation's legal claim to water rights in the Upper Colorado Basin resulting from entering into the Replacement Lease. The Bureau of Indian Affairs has a trust obligation to the Navajo Nation to ensure that its' legal claims to water rights is not adversely impacted by entering into the Replacement Lease. The EIS must also evaluate the environmental impacts of the use of 950 acre-feet per year from Lake Powell.[17]

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[13] Section 7(D) of the Replacement Lease.
[14] Section 8(B) of the Replacement Lease.
[15] Section 10 f the Replacement Lease.
[16] Section 14 of the Replacement Lease.
[17] Section 14(D) of the Replacement Lease.

l. The waiver of sovereign immunity must be evaluated.

The Replacement Lease requires the Navajo Nation to waive its sovereign immunity.[18] The EIS must evaluate the financial and legal implications to the Navajo Nation resulting from this waiver. The Bureau of Indian Affairs has a trust duty to the Navajo Nation to ensure its sovereign immunity is not adversely affected by entering into the Replacement Lease.[19]

m. The indemnification and waiver provisions must be analyzed in the EIS.

The Replacement Lease requires the Navajo Nation to indemnify NGS Lessees and waive its rights to legal recourse against the NGS Lessees for previous contamination at the NGS site.[20] The financial implications of these provisions must be analyzed in the EIS. The Bureau of Indian Affairs has a trust duty to the Navajo Nation to advise the financial implications of these provisions.[21]

n. The agreement not to regulate must be analyzed in the EIS.

The Replacement Lease requires the Navajo Nation to waive its right to regulate the NGS Lessees during the Lease Term and throughout the following 35+ years of remediation and oversight.[22] The financial implications of this waiver must be analyzed in the EIS, including inability to mandate hiring of Navajo workers, lost permitting fees, loss of potential Navajo Nation government jobs related to regulation of the site, and other financial implications. The Bureau of Indian Affairs has a trust duty to the Navajo Nation to disclose the financial impacts of this waiver.[23]

Thank you for the opportunity to submit comments. Please prepare a thorough EIS for this matter and incorporate all of our comments.

Dine' CARE
Adella Begaye
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To' Nizhoni Ani
Nicole Horsehereder
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[18] Section 19 of the Replacement Lease.
[19] See Section 28 of the Replacement Lease.
[20] Sections 23 and 36 of the Replacement Lease.
[21] See Section 28 of the Replacement Lease.
[22] Section 26 of the Replacement Lease.
[23] See Section 28 of the Replacement Lease.

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Officially known as the Zuni Tribe of the Zuni Indian Reservation

06 June 2017

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, Colorado 80218

RE: Pueblo of Zuni's Response to Public Scoping Notice for NGS Operations Through December 2019 and Initiating NGS Retirement Activities Beginning in 2020.

Dear Lisa A. Meyers, Phoenix Office Area Manager, Bureau of Reclamation:

The Pueblo of Zuni is responding to the public scoping notice for an Environmental Assessment (EA) covering the Navajo Generating Station (NGS) operations through December 2019 and the initiation of NGS retirement activities slated to begin in 2020. As stated in a previous correspondence to the Bureau of Reclamation (Reclamation) related to Reclamation's previous Environmental Impact Statement process associated with the continued operations of NGS from 2020 through 2044, Zuni traditional history begins with our emergence in the Grand Canyon, followed by the migration of Zuni medicine societies and kiva groups throughout the Southwest and beyond to find *I'diwana*, or the "Middle Place," which is the current location of Zuni Pueblo. A recounting of our traditional history reveals many medicine societies and kiva groups journeyed through and resided in the area which is under consideration of this EA scoping process. Based on Zuni traditional history and our cultural and historical affiliation to the entire area encompassing the NGS and associated transmission lines, the Pueblo of Zuni requested participation, as a cooperating agency, in Reclamation's compliance processes under the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA). The Pueblo of Zuni was afforded cooperating agency status during the previous NEPA compliance process and anticipates similar recognition by Reclamation and the Bureau of Indian Affairs during this new EA process.

As stated above, the geographical area under consideration in this EA is contained within Zuni ancestral lands. Historical events coupled with unilateral decisions by the United States Government established geo-political boundaries throughout Zuni ancestral lands, effectively restricting and denying Zuni people from free access to many important traditional cultural places and effectively limiting the ability of the Zuni people to perform traditional practices and reaffirm our steward relationship to this area. In spite of these restrictions, the Zuni people have maintained a spiritual stewardship connection to these important places through our recognition in the recitation of Zuni prayers and ceremonial activities. As such, these lands and their innumerable environmental resources continue to play fundamental roles in the health and wellbeing of the Zuni cultural environment and they retain intensive ongoing traditional religious and cultural importance to Zuni identity, which is founded on living Zuni cultural beliefs and practices.

Similar to previous comments offered on the public draft of the former EIS, the Pueblo of Zuni is concerned that this new EA process will be fundamentally flawed because it will be biased toward an Anglo-American, Western positivist and science-centric paradigm that will noticeably fail to give commensurate consideration and

integration, quantitatively or qualitatively, of the Zuni (and other Native American) perspective and values toward the environment, values associated with the natural and cultural resources that comprise the environment, and the negative effects the proposed action(s) may have on the Zuni and other Native Americans' stewardship responsibilities toward Mother Earth. The Pueblo of Zuni's position is that in identifying, assessing, and evaluating impacts to Zuni resources considered in this new EA and as part of the NEPA process requiring comprehensive consideration of and attention to the "human environment" at 40 CFR 1508.14, the Pueblo of Zuni is not beholden to the artificial dichotomies between natural and cultural 'resources' proposed by Western science and concepts. Moreover, the Pueblo of Zuni believes that a central purpose of NEPA and its compliance process is to "provide full and fair discussion of significant environmental impacts" and that this should "inform decision-makers [i.e., Reclamation and Bureau of Indian Affairs] and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment" (40 CFR 1502.1). As part of these regulatory responsibilities, it is vital that Reclamation and the Bureau of Indian Affairs recognize and respectfully consider and incorporate the breadth and complexity of the Zuni human-environment relationship, its underlying philosophical doctrines and principles and associated concerns as an integral part of the NEPA process, including NEPA requirements to identify, assess, and evaluate significant impacts to natural and cultural resources in the entire project area covered by this EA, including associated transmission lines.

Because the "purpose and need" statement is ambiguously defined in the 23 May 2017 scoping memorandum, it is difficult for the Pueblo of Zuni to respond specifically; however, public statements by Navajo Nation President Russell Begaye and Salt River Project Agricultural Improvement, and Power District (SRP) regarding the immanent closure of the NGS facility without the lease extension for NGS facility decommissioning activities suggest that coal mining at the Kayenta Mine would also cease operations within the next two months without this lease extension. Thus, while the scoping memorandum states that the decision being analyzed by this EA will not "authorize additional coal mining at the Kayenta Mine," a decision in favor of the lease extension by Reclamation and/or Bureau of Indian Affairs will *de facto* result in mining that would not occur without the lease extension. Any additional coal mining at Kayenta Mine resulting from this lease extension and potential impacts to Zuni natural and cultural resources, therefore, must also be directly considered as part of this EA. Further, in Navajo Nation Legislation 0194-17 regarding the NGS lease extension, the Navajo Nation is attempting to retain several assets, including the ". . Lake Pump Facility, electrical distribution lines from the 230kV switchyard and the 230kV switchyard." The water associated with Lake Powell and the pump facility is sacred to the Zuni people, and the electrical distribution lines transect our ancestral migration and ceremonial areas. As such, both actions related to the lease renewal warrant focused analysis and attention from Zuni perspectives on what the impacts of use of these facilities and infrastructure beyond 2020 by the Navajo Nation may have on Zuni natural and cultural resources.

As part of this EA, and the entire NEPA process associated with NGS operations through December 2019 and the initiation of NGS retirement activities slated to begin in 2020, the Pueblo of Zuni underscores the need for Reclamation and the Bureau of Indian Affairs to give adequate and good faith attention and consideration to traditional Native American values and the resultant direct, indirect, and cumulative cultural impacts that may result from a federal undertaking on the Zuni people and other Native American traditional practitioners as minority groups who may be disproportionately affected by this Federal action. Native American perspectives and knowledge sovereignty must be respected throughout the EA process and granted equal standing with Western forms of knowledge production. To that end, as stated in my previous letter dated 27 December 2016, the previous public draft EIS was released prematurely because it did not have the beneficial and necessary results and concerns of the Zuni people that would have been provided to Reclamation as an outcome of the Zuni traditional cultural property assessment had the associated NEPA and NHPA process not been truncated and

suspended. This point warrants special attention under this new EA, as part of its task, as stated in the scoping memorandum, is to evaluate and use "the existing EIS process ... to determine how to comply with NEPA and other statues." The Pueblo of Zuni's position is that the development of the proposed EA process will be considered insufficient in achieving compliance with NEPA mandates and procedures unless it incorporates the needed Zuni information on the human environment relationship and assessments of significant direct, indirect, and cumulative impacts to the natural and cultural resources that are vitally important to the ongoing traditional religious and cultural beliefs and practices and health and well-being of the Zuni people.

Should you have any questions or need additional information please contact Mr. Kurt Dongoske, Tribal Historic Preservation Officer, at 505.782.4814.

Sincerely,

Val Panteah, Sr.
Governor

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June 9, 2017

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 81218
via email to NGS-EA@eroresources.com

RE: Comments on Public Scoping for an Environmental Assessment Covering Navajo Generating Station Operations Through December 2019 and Retirement Activities Beginning 2020

Dear U.S. Department of Interior and ERO Resources Corporation:

This firm represents Travelers Casualty & Surety Company of America ("Travelers") in matters relating to Peabody Energy Corporation ("Peabody") and that entity's coal mining, reclamation, and other obligations covered under numerous surety bonds issued by Travelers. We submit the following comments on the public scoping for the environmental assessment for continued operation of the Navajo Generating Station ("NGS") through 2019. In summary, because the NGS is the sole customer of coal produced by the nearby Kayenta Complex, continuing operation of the NGS directly impacts the ability to continue mining, reclamation, and other environmental compliance activities at the Kayenta Complex. Therefore, the scope of significant issues that should be analyzed in an environmental assessment of the NGS include the need for an orderly cessation of operations at the Kayenta Complex that provides time and resources to address the extensive environmental obligations of the mining complex that has provided coal for NGS for many decades. *See, e.g.,* 40 C.F.R. §§ 1501.7 and 1508.25.

The Kayenta Complex consists of the active Kayenta Mine and its neighbor to the southwest, the Black Mesa Mine. The Kayenta Mine has only one customer: the NGS. We are informed that the NGS buys from five to eight million tons of coal per year and that the Kayenta Complex production is approximately one-half of Peabody's production from its western operations. The continued operation of the NGS and its continued consumption of coal are crucial to the viability of the Kayenta Complex.

The Kayenta Complex operates on Native American lands subject to three mid-1960s coal leases with the Navajo and Hopi Nations. The leases cover 64,858 acres or about 100 square miles. Regulatory provisions of the U.S. Department of Interior require surety bonds to support the lease obligations. Both the Black Mesa and Kayenta Mines began operation before the August 3, 1977, enactment of the federal Surface Mining Control and Reclamation Act ("SMCRA"). Peabody has subsequently obtained a SMCRA permit for the Kayenta Mine. The

permit demands on-going environmental compliance and reclamation of the land after completion of mining operations. SMCRA requires that a permittee provide financial assurance such as surety bonds to support compliance with the permit obligations. The total amount of surety and other financial assurance related to the Kayenta Complex is approximately $300 million. Travelers is one of the sureties that has provided surety bonds related to the complex.

The Kayenta Complex includes thousands of acres that have been disturbed during mining and are either still involved with active mining or are in status of partial reclamation that includes grading, topsoil replacement, and re-vegetation. An untimely end of operations of NGS would mean loss of revenue from coal sales to the NGS and would adversely impact Peabody's ability to complete the obligations under the leases and SMCRA. The associated reduction in operations at the Kayenta Complex would reduce income to the Navajo and Hopi Nations due to loss of the lease payments and would also cause the loss of jobs for approximately 300 employees, most of which are Native Americans. All of these related impacts on the operations at the Kayenta Complex should be considered in the scope of the environmental assessment because they are cumulatively significant impacts. *See, e.g.,* 40 C.F.R. § 1508.25(a)(2).

Sincerely,

W. Blaine Early, III

628849

June 9, 2017

Leslie A Meyers
Phoenix Office Area Manager
Lower Colorado Region

Sharon Pinto
Regional Director
Navajo Region Bureau of Indian Affairs

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Via email: NGS-EA@eroresources.com

Re: Public Scoping Notice for Navajo Generating Station Operations Through December 2019 and Initiating NGS Retirement Activities Beginning in 2020. , PXAO-1500, ENV-6.00, dated May 23, 2017

Dear Ms. Meyers and Pinto:

Please accept these comments on the scope of NEPA analysis of Navajo Generating Station (NGS) Operations and approvals by Department of the Interior agencies, including Bureau of Reclamation and Bureau of Indian Affairs ("Agencies"). We submit these comments in response to the May 23, 2017 scoping memorandum ("Memorandum") we received on May 30, 2017.

These scoping comments focus primarily on the need for any NEPA analysis of a new lease agreement to allow extend the time for NGS retirement beyond the December 2020 date in the 1969 lease and future operations of the plant to include analysis of the environmental and socioeconomic consequences related to other parts of the NGS-Kayenta Mine Complex. Other issues, including the premature nature of this scoping period, are also important and listed below, but the details of those issues are provided in comments by John Barth et al. submitted June 9, 2017

I. NEPA Analysis of NGS Lease Agreements and Operations must include analysis of impacts on all parts of the NGS/Kayenta Mine complex.

At the appropriate time, once the Navajo Nation and Lessees have a proposed action for future operation and retirement of NGS and a proposed plan for retirement, the NEPA analysis must include look at entire complex, which includes, at a minimum

The Draft Environmental Impact Statement Navajo Generating Station-Kayenta Mine Complex Project, released in September 2016, (DEIS) identifies the components of the "Navajo Generating Station/Kayenta Mine Complex" (NGS/KMC Complex) as consisting of related project components: the power plant, the coal mine, and electrical transmission and distribution in central/southern Arizona.

The socioeconomic and environmental impacts of changes in the lease agreement, plant operations, and ultimately retirement of the plant should be assessed for each of the NGS/KMC Complex components, including the Kayenta Mine Complex.

The Memorandum tries to limit the NEPA evaluation to "retirement" activities at the NGS site and to exclude "reclamation activities associated with the Kayenta Mine, as required by the Surface Mining Control and Reclamation Act and as detailed in the approved reclamation plan." Memorandum, p. 1, footnote 1.

"Retirement" of the plant will result in not only the end of power generation, but also the end of demand for coal from the Kayenta Mine and the loss of the only customer of the 78-mile-long Black Mesa and Lake Powell Railroad. As noted in the DEIS,

> [T]he NGS presently is the sole commercial customer for the coal mined at the Kayenta Mine. Furthermore, the mine is distant from other existing coal-fired power plants, and those plants have established suppliers. Finally, the BM&LP Railroad that currently transports coal to NGS is not tied into the national rail network and, therefore, would be unable to serve as an initial link to ship coal to other markets. As a result, the potential for PWCC to find another market for its coal is low and the company has indicated it likely would move to close the proposed KMC and proceed to final reclamation of the Kayenta Mine and the former Black Mesa Mine and all support facilities not approved by OSMRE and the Navajo Nation as permanent facilities. . . . . Vegetation establishment and final bond release and lease relinquishment could take up to 10 to 15 years after reclamation is complete. DEIS, p. 2-39.

Recommendation: Any environmental evaluation of the retirement of the NGS power plant must also include an evaluation of the Kayenta Mine/Black Mesa coal mine. The coal mine is an integral component of the overall complex and cannot be segmented from the current NEPA analysis. A full EIS is required to evaluate the impacts and alternatives associated with retirement of the complex—not just the NGS site.

The assessment should address concerns related to the Kayenta and Black Mesa Mines historic impacts on communities, people, and the land that were raised in scoping and comments on the DEIS. These include, but are not limited to, the following:

- The effects to Black Mesa resulting from mining causing irreversible changes in Navajo and Hopi community sustenance, traditional uses, and religious experiences associated with certain places such as springs.
- Effects of past industrial uses of groundwater underlying Black Mesa.
- Treatment of cultural resources and burials within Kayenta-Black Mesa lease boundaries.
- Impacts on Navajo and Hopi community members who work as mine employees, live near active mining areas, and traverse part of the mine permit area on public and local roads.
- Effects of fugitive dust, blasting, and changes in surface water quality from mining operations and future reclamation on the health of residents living near the mine;
- The magnitude and duration of mine-related groundwater pumping effects on spring and channel flows, and on wells that support human and livestock use;
- Mine reclamation practices that meet the regulatory requirements, but also should consider and support traditional uses (wildlife, plants for cultural use and food, livestock);
- Limitations on access by community members to water sources and grazing areas;
- The identification, treatment, and protection of archaeological resources, sacred sites, and burials on areas to be mined;
- Current and future status of public services provided to the local community by PWCC, including creation and access to surface water sources, public road maintenance, and provision of coal used for winter heating.
- Cumulative impacts: The large geographic area affected by NGS, the Black Mesa and Lake Powell Railroad, and the extent of mining on Black Mesa, and all of the associated project components (including transmission facilities, mining facilities, roads, etc.) the Agencies should assess cumulative impacts of past, present, and future actions.

II. Additional Issues

Other issues addressed in greater detail in comments submitted by John Barth et al., on June 9, 2017, are also important and should be addressed as the Agencies determine the process and scope of NEPA analysis for future NGS operations. Some of those issues include:

1. <u>The premature timing of the scoping process because of the lack of a proposed action.</u> "The exact nature of any Federal approvals will depend on the agreement reached between the Nation and the Lessees, and the

rights-of-way required." Memorandum, p. 2. Without a final signed lease or land use agreement, the undersigned conservation organizations are unable to provide meaningful input at this time and the NEPA scoping process is premature. **Recommendation:** The Agencies should withdraw the May 23, 2017 Memorandum and postpone the NEPA scoping process until a final lease and related land use agreements are fully executed by the NGS Lessees and formally approved by the Navajo Nation.

2. Arbitrary Assumption about Scope of Environmental Assessment.

Before the NEPA process has even begun, the Agencies have arbitrarily presumed that an Environmental Impact Statement ("EIS") will not be prepared for this major federal action. Specifically, the Memorandum states, "[i]t is likely that one, or both, of the Federal agencies will need to complete an Environmental Assessment (EA) regarding the pending Federal approvals related to NGS." Memorandum, p. 2.
Recommendation: The Agencies must not presume the extent of the environmental analysis before a final proposal is even adopted. The scope and nature of the environmental and socioeconomic impacts of closure of the NGS plant, resulting closure of the Kayenta Mine, retirement and all associated work at NGS, and the reclamation requirements and activities for the Kayenta Mine Complex, and other impacts on other components of the NGS/Kayenta Mine Complex will likely require an EIS.

3. Agencies should release the "Retirement Plan" before draft NEPA documents.

The draft Replacement Lease references a "Retirement Plan" that will govern all activities at the NGS site after power generation ends, including, but not limited to, decommissioning, demolition, and removal of facilities, restoration of lands, post-closure monitoring, and access. However, the Retirement Plan has yet to be drafted and has not been provided to the public. The Retirement Plan is a crucial document needed to evaluate the scope and impacts of the project.
Recommendation: The Agencies should release the Retirement Plan and allow public comment before issuance of a draft EIS (or draft EA).

4. NEPA assessment should evaluate socio-economic implications of the proposed action.

Recommendation: The EIS must identify all of the federal government and NGS Lessees' existing socio-economic contractual obligations to the Navajo Nation and Hopi tribe and produce the documents containing these obligations, including but not limited to any treaties, contracts, or agreements.

5. The NEPA process must evaluate impacts and alternatives authorized by the Replacement Lease

Recommendation: The NEPA process for changes in the lease agreement and operation of NGS should addresss the following issues: environmental impacts of the two year operation of the NGS plant and Kayenta Mine, impacts to global climate change resulting from the creation and release of greenhouse gases at the NGS/Kayenta complex, closure in place, restriction of use, Impacts to land, air and water associated with remediation and reclamation, impacts to the surrendered property from future uses, expansion of the coal ash landfills, environmental condition of surrendered lands, failure to post bonds, costs of O & M of the transmission lines, loss of Navajo Nation tax revenue, impact of water use during and after the lease must be evaluated. waiver of sovereign immunity, indemnification and waiver provisions, agreement not to regulate.

Please accept these comments, and the recommendation that you re-open scoping once the Navajo Nation and Lessees have an agreement. We appreciate the opportunity to participate in ensuring that the environmental impacts—including beneficial impacts—of retirement of the NGS-Kayenta Mine Complex are thouroughly understood by parties and stakeholders and the retirement and reclamation commitments to the Navajo and Hopi Nations are comprehensive, meet legal and moral obligations, and will be met.

Sincerely,

Pamela Eaton
Senior Advisor, Energy and Climate

Emily Thorn

From: Sabrina Hardenbergh <sabrina@midwest.net>
Sent: Friday, June 09, 2017 11:00 PM
To: Sabrina Hardenbergh; NGS-EA
Subject: Re: Public Scoping for Environmental Assessment Covering Navajo Gnerating Station Operations through Dec. 2019 and Retirement in 2020

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

NGS-EA staff:

Please see my comments below in the email that I just sent regarding the Public Scoping for Environmental Assessment Covering Navajo Gnerating Station Operations through Dec. 2019 and Retirement in 2020.

Sabrina Hardenbergh
1 Hardenbergh Road
Carbondale, IL 62902
618-549-2608

-----Original Message-----
From: Sabrina Hardenbergh
Sent: Jun 9, 2017 11:55 PM
To: NGS-EA@eroresources.com
Subject: Public Scoping for Environmental Assessment Covering Navajo Gnerating Station Operations through Dec. 2019 and Retirement in 2020

NGS-EA staff:

I am writing in response to mail that I received recently in my held mail after a vacation re Public Scoping for Environmental Assessment Covering Navajo Generating Station Operations through Dec. 2019 and Retirement in 2020, to which I am to respond/comment by June 9th.

I support the deadlines for the Navajo Generating Station to stop its coal fired electricity generation on Dec. 2017 so as to finish its retirement activity by Dec. 2019. I and
Sabrina Hardenbergh
1 Hardenbergh Road
Carbondale, IL 62902
618-549-2608 many others have long argued for the halt of coal mining on Black Mesa that supplies NGS, and instead to transition the region to renewable energy promptly. We have already argued this from a basis of many pollution, health, and environmental and cultural heritage degradation issues. Arizona and its water supply transmission must transition to renewable energy. Local Native Americans and other citizens are willing to be part of this work force to enact the renewable energy across Arizona. I am less impressed by arguments to delay this process two more years.

This is written by one who formerly lived and worked on Black Mesa in the early 1980's, who lives presently in another coal mining region in our country, and who has periodically returned to northern Arizona to see the problems with our energy infrastructure, health and environment, cultural heritage and economic issues.

NGS Retirement EA Scoping Comments
ERO Resources Corp.
1842 Clarkson Street
Denver, CO 80218
Via email: NGS-EA@eroresources.com

Re: COMMENTS OF THE GILA RIVER INDIAN COMMUNITY ON THE SCOPE OF AN ENVIRONMENTAL ASSESSMENT COVERING NAVAJO GENERATING STATION OPERATIONS THROUGH DECEMBER 2019

Dear Sir or Madam:

The Gila River Indian Community (the Community), a Federally-recognized Indian tribe, hereby submits its comments on the scope of an Environmental Assessment covering Navajo Generating Station (NGS) operations through December 2019 (NGS EA). Based upon the Department of the Interior's May 23, 2017 Memorandum regarding NGS scoping (Scoping Memorandum), the Bureau of Reclamation and the Bureau of Indian Affairs (the Agencies) are seeking public input on (i) the potential impacts of possible federal decisions related to the operations of NGS through December 2019; (ii) retirement activities post-2019; and (iii) other concerns that should be addressed in the EA.[1]

INTERESTS OF THE COMMUNITY

The Community has a significant interest in the future of NGS, and thus the outcome of the EA process. The United States constructed and participates in NGS to provide electricity to deliver Colorado River water entitlements to tribes with federally approved Indian water rights settlements and Central Arizona Project (CAP) contracted water to other water users pursuant to federal statute. NGS supplies approximately 95% of the power to deliver Colorado River water entitlements to the Community and other settling tribes, and to other CAP customers. The Community's annual entitlement to 311,800 acre feet of Colorado River water delivered through a contract with the Secretary makes the Community the single largest entitlement holder and user of water delivered using the CAP in the State. The Community's entitlement to Colorado River water delivered to the Community through a water delivery contract with the Secretary is also a trust resource – *i.e.*, is held in trust by the United States for the benefit of the Community.[2]

Based upon initial studies and data presented at the NGS Stakeholder Meetings, the continued generation of electricity at NGS between December 2017 and December 2019 will cause the cost of water delivered through the CAP to entitlement holders to be more expensive than if NGS operations ceased in December 2019 and replacement power (*e.g.*, natural gas) was used to pump and deliver water through the CAP. Further, changes in operations at NGS could affect the

[1] Scoping Memorandum at 2.
[2] *See* Gila River Water Rights Settlement Act of 2004, Section 204(b), P.L. 108-451, Dec. 10, 2004.

amount of revenue generated for the Lower Colorado River Basin Development Fund (Development Fund), which defrays the Community's cost of obtaining and using its entitlement to Colorado River water. As such, the Community has a very significant interest in the NGS EA process and the outcome of Agencies' decision-making regarding NGS.

As the single largest tribal entitlement holder of Colorado River water delivered through a contract with the Secretary, the Community will be most greatly impacted by increased energy costs resulting from NGS continuing to generate energy for CAP pumping (as compared to securing less expensive CAP replacement power) through 2019. Coupled with this, the Community has contended in the past with threats to delivery of its Colorado River water entitlement through the CAP based upon EPA rulemakings and was forced to fight for decades to secure its water rights. As such, the Community has "special expertise" regarding the impact of the Agencies' decisions at NGS, and therefore requests cooperating agency status in connection with preparation of the NGS EA. Indeed, Reclamation has already recognized the Community as a cooperating agency in connection with the NGS EIS, so precedent exists for this status in connection with decisions affecting energy generation at NGS.

GENERAL COMMENTS

The Community has the following general comments regarding the scope of the NGS EA:

- The Scoping Memorandum states: "[T]he Department intends to focus its efforts on an EA for continuing operations through the end of December 2019." The Community agrees that the EA's analysis of the potential for NGS to continue generating electricity should be limited to the time period of December 2017 – December 2019. Any post-2019 discussions in the EA should be limited to retirement (as defined in the Scoping Memorandum).

- The scope of the NGS DEIS (issued in September 2016) included impacts associated with extending the operations of NGS for 25 years after the 1969 Lease term. While the actions to be studied in the NGS EA involve extending operations for a shorter time period, the scope of the impacts, at least with respect to NGS operations, will be substantially the same in the NGS EA as the NGS EIS (despite the shorter timeframe of additional operations). As such, as was the case with the NGS EIS, the EA should evaluate impacts on: tribes with Colorado River entitlements pursuant to federal approved Indian water rights settlements, Indian Trust Assets, socioeconomic resources, water resources and other tribal concerns.

- The NGS stakeholders process has resulted in a significant amount of NGS-related data and studies both from the United States and from the non-federal stakeholders, including data and studies concerning energy costs. While some data has been somewhat speculative,[3] the Agencies should utilize the relevant, non-speculative data from this process, including the Community's energy cost information and the Community's and United States' Development Fund data and projections.

[3] This speculative data tended to be focused on issues outside the scope of this EA, such as potential NGS buyers.

PURPOSE AND NEED

The Community has the following comments regarding the scope of the EA's Purpose and Need statement (on which the Scoping Memorandum is silent):

- The EA's purpose and need statement must reflect NGS' connection to CAP pumping water to satisfy water delivery obligations established in federal Indian water settlements. As such, the "purpose" should include securing a "reliable" source of power and energy that is "continuously available," and assuring that NGS' energy is priced so that Colorado River water delivered using CAP canals remains affordable to tribes that have settled their claims for water rights, in part, in exchange for entitlements to Colorado River water delivered to them through contracts with the Secretary.

- There is also a need for federal decisions to be consistent with Federal Indian policies, including preference for self-determination and promoting and sustaining tribal economic development. In determining this consistency, the Agencies must consider the trust obligations the United States has to tribes and the need to protect trust assets. With respect to the Community, there is an express trust responsibility to protect the water rights that the Arizona Water Settlement Act (AWSA) provides to the Community.[4] As trustees of the Community's water rights, the Agencies' decisions must consider their trust obligations, and this is therefore a need that the Agencies' actions must address.

ALTERNATIVES

- Consistent with the Community's comment above regarding Purpose and Need, the Agencies should not carry forward and analyze any alternative that fails to provide a reliable source of power and energy for CAP to pump and deliver Colorado River water entitlements to settling tribes, provide energy that is priced to ensure that Colorado River water delivered as part of federally approved Indian water rights settlements remains affordable to such tribes, or that fails to protect trust resources.

- The Scoping Memorandum states that without an agreement (which triggers federal authorization requirements and NEPA) "NGS would need to stop generating electricity by December 2017, so that retirement could be completed before the 1969 Lease expires in December 2019." The "No Action" alternative to be studied under NEPA therefore will contemplate NGS ceasing to produce energy in December 2017 and CAP procuring replacement power from another source.

- None of the alternatives evaluated in the EA should include the generation of electricity at NGS beyond December 2019.

RESOURCE AREAS / IMPACTS FOR STUDY IN THE EA

[4] Arizona Water Settlements Act, Pub. L. No. 108-45, § 204(a)(2), 118 Stat. 3494 (2004). Section 204(a)(2) of the AWSA states: "the water rights and resources described in the Gila River Agreement shall be held in trust by the United States on behalf of the Community . . . ."

The EA should identify and analyze the following impacts:

a. Tribal Concerns

Given the direct relationships between the NGS decisions (that are the subject of the EA), the delivery of affordable Colorado River water entitlements to settling tribes, and economic and cultural implications to the Community, the EA should analyze the direct, indirect and cumulative impacts on the Community, and other tribes with entitlements to Colorado River water as part of a federally approved Indian water rights settlement, of all alternatives evaluated in the NGS EA, including any impacts resulting from an alternative that would significantly modify operations in a way that affects the delivery of Colorado River water to such settling tribes.

Changes at NGS that could result from the Agencies approving new agreements between the NGS owners and Navajo Nation could impact the Community in two key ways. Changes could affect: (1) the energy cost associated with the delivery of their statutory entitlement to Colorado River water through the CAP canals and; (2) revenue generated for the Development Fund, which is used to defray the Community's cost of obtaining and using the water to which it is entitled under the AWSA and pursuant to judgments from State and federal courts approving the Community's settlement.

Any decision that results in a significant rise in water costs would make it extremely difficult, if not impossible, for the Community to pay for its entitlement to Colorado River water, one of the primary uses of which is for Community agriculture. Farming the Community's land is of great importance for cultural, economic, and health reasons. Largely using federal funds, the Community is developing an expansive 2,400-mile irrigation canal system under the Pima-Maricopa Irrigation Project to deliver its settlement water supplies, including its very significant entitlement to Colorado River water, throughout the Community to sustain the agricultural economy, meet the needs of the Community's municipal and industrial water users, and establish riparian and recreational areas.

Thus, impacts on the Community, which entail cultural, economic, and health ramifications on Community members and the Reservation, must be studied and considered as part of the EA process.

b. Federal Trust Obligations

In studying trust resource impacts in the EA, the Agencies must consider impacts to the Community's water rights. The United States has an express trust responsibility to protect the water rights that the AWSA provides to the Community. Section 204(a)(2) of the AWSA states: "the water rights and resources described in the Gila River Agreement shall be held in trust by the United States on behalf of the Community . . . ."[5] As trustee of the Community's water rights, the Agencies cannot ignore the impacts on the Community's trust assets.

[5] Arizona Water Settlements Act, Pub. L. No. 108-45, § 204(a)(2), 118 Stat. 3494 (2004).

c. Cost of Power

As stated, continuing to use NGS-generated energy to power the CAP pumps (versus using replacement power that is both available and less expensive than NGS power) will increase the cost of water delivery of Colorado River water entitlements to settling tribes, which constitutes a significant financial burden and economic impact on such tribes. NEPA requires that EAs include an analysis of economic impacts. Given that the No Action alternative would entail CAP using less expensive replacement power to deliver Colorado River entitlements to settling Indian tribes such as the Community, the EA must identify and analyze the difference in water costs based open whether NGS is or is not generating electricity between December 2017 and December 2019.

CONCLUSION

The Community appreciates the opportunity to submit scoping comments and looks forward to working with the Agencies as a cooperating agency in the NGS EA process.

KEEPER - PX.HO - FSOU
ENV 6.00

(1) NO LONG TERM LEASE FOR COAL OPERATIONS AT PLANT - 2044? NUTS!

(2) ENCOURAGE SWITCHING TO GAS OR BETTER YET - RENEWABLES.

(3) HAZE AND MERCURY FROM PLANT ARE TERRIBLE.

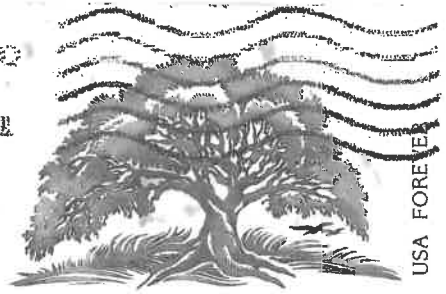
THANKS

(22 CLEMATIS CIR
SANTA FE, NM 87506)

BRIAN HOFFMAN

ALBUQUERQUE NM 870
05 JUN 2017 PM 3 L

Mr. Brian Hoffman
22 Clematis Cir
Santa Fe, NM 87506-1292



NGS RETIREMENT EA SCOPING
EKO RESOURCES
1842 CLARKSON ST
DENVER, CO 80218

B-100842

HUNSUCKER
GOODSTEIN
HGNLAW.COM

Anne E. Lynch
Attorney
Phone: 202-895-5384
ALynch@hgnlaw.com

June 9, 2017

VIA e-Mail and U.S. Mail

Leslie A. Meyers
Phoenix Area Manager
Lower Colorado Region
Bureau of Reclamation
6150 West Thunderbird Road
Glendale, AZ 85306-4001
lmeyers@usbr.gov

Sharon Pinto
Regional Director
Navajo Region
Bureau of Indian Affairs
sharon.pinto@bia.gov

Re: Request for Two-Week Extension to File Comments on NGS Retirement Environmental Assessment Scoping

Ms. Meyers and Ms. Pinto:

Through this letter the Hopi Tribe is requesting a short extension for submitting public comments on the Scoping of the NGS Retirement Environmental Assessment. The Hopi Tribe stands to be disproportionately impacted by the closure of NGS due to the significance of revenues directly and indirectly from NGS for the Hopi Tribe's economic wellbeing. The Tribe is in the midst of a transition in leadership in the General Counsel's office, and requires a two-week extension to finalize and submit comments—until June 23, 2017. We will, of course, endeavor to submit comments sooner than June 23, 2017 if possible. Please feel free to contact me at any time by email or phone as necessary.

Very truly yours,
Hunsucker Goodstein PC

Anne E. Lynch

Cc: NGS Retirement EA Scoping Comments, NGS-EA@earesources.com
Sean Heath, U.S. Bureau of Reclamation, SHeath@usbr.gov
Harrilene Yazzie, U.S. Bureau of Indian Affairs, Harrilene.Yazzie@bia.gov

Emily Thorn

From: Robert S. Lynch <RSLynch@rslynchaty.com>
Sent: Friday, June 09, 2017 6:27 PM
To: NGS-EA
Cc: Robert S. Lynch
Subject: NGS EA Scoping

This should be a no brainier. You already have a draft EIS and comments. You've already said in the scoping letter all the things this EA won't cover. This is a snapshot in a film that has already been shot. Two years or bust.

Once you know what the Navajo Tribal Council decides, the EA should write itself.

Bob Lynch

Robert S. Lynch
Robert S. Lynch & Associates
340 E. Palm Lane, Suite 140
Phone: (602) 254-5908
Fax: (602) 247-9542
Cell: (602) 228-6355
E-Mail: rslynch@rslynchaty.com

Sent from my iPhone

June 7, 2017

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Subject: Complaint concerning Bureau of Reclamation (BOR) EA public scoping relating to Navajo Generating Station (NGS

This is a complaint regarding the above subject: EA Scoping is premature and is not based on an application by owner(s) of NGS, whoever they may be. The rush to expedite the scoping process will undoubtedly create confusion and possibly legal challenge. The Public is given only until June 9, 2017 to submit what is to be studied and assessed. The "memo", from BOR, is based on the assumption that NGS will continue to operate at least up to the end of year 2019, only six months from now.

In the memo is a statement; "until more information about operating after December 2019 is known, the Department intends to focus its efforts on the EA for continuing NGS operations through the end of December 2019."

Black Mesa Trust (BMT), in their Comprehensive 2002 Comment relating to Peabody Western Coal Co.'s (PWCC) application to incorporate a portion of Kayenta Mine into Black Mesa, raised the question whether PWCC is the "True Applicant?" Office of Surface Mining – Denver Office has, to this day, refused to answer our question. This raises the question that PWCC could be mining illegally.

SMCRA regulation clearly states that the applicant for permit must meet the definition of: "True Applicant." Until the applicant is confirmed to be the True Applicant, the application cannot be Administratively Complete and cannot proceed. So, who is the true applicant to operate NGS to 2019 and beyond?

Please extend the comment deadline date. For Hopi people, who are busy with the start of planting season and ceremonies associated with farming, commenting on the EA is a distraction and an intrusion into their ceremonies. This has happened before with previous EA, and EIS Scoping. Wait for the dark shadow hanging over NGS to be lifted before you decide to proceed with Scoping activities. Why the rush? Who does in benefit?
Respectfully,

Vernon Masayesva
Founder & Director, Black Mesa Trust
P.O. Box 33
Kykotsmovi, AZ 86039
Cell: (928) 255-2356
E-Mail: kuuyi@aol.com

THE NAVAJO NATION

RUSSELL BEGAYE PRESIDENT
JONATHAN NEZ VICE PRESIDENT

June 9, 2017

Leslie A. Meyers
Phoenix Office Area Manager
Lower Colorado Region
U.S. Bureau of Reclamation

Submitted electronically via NGS-EA@eroresources.com

Sharon Pinto
Regional Director
Navajo Region
U.S. Bureau of Indian Affairs

RE: Navajo Nation Comments for Public Scoping for an Environmental Assessment Covering Navajo Generating Station Operations Through December 2019 and Retirement Activities Beginning in 2020 (Action by June 9, 2017)

Dear Ms. Meyers and Regional Director Pinto:

The Navajo Nation (the "Nation")'s Naanish doo' Iina Task Force negotiated with the Navajo Generating Station ("NGS") Owners to reach an agreement that would allow NGS to continue operations through December 2019 and NGS retirement, remediation and restoration activities to occur post-December 2019. Through these successful negotiations, the Nation and the NGS Owners developed a "Replacement Lease" that will allow for this scenario to occur. The Replacement Lease is currently in the Nation's legislative process and will need to be approved by the Navajo Nation Council.

The Nation currently has an estimated unemployment rate of 52%. The jobs at NGS and the Kayenta Mine are generally high-skilled and high-paid jobs. These jobs are irreplaceable. The Nation's government also receives significant revenue from NGS and the Kayenta Mine. Without this revenue, all 110 Chapters of the Navajo Nation will be negatively impacted when NGS shuts down. Therefore, it is in the Nation's best interest to keep NGS operating for as long as possible. The Nation strongly supports the continued operations of NGS post-December 2019, but understands that the critical first step in the process is assuring the continued operations of NGS through December 2019. The Replacement Lease provides this assurance.

The Replacement Lease also contains many critical components, including the "Navajo Project Retirement Guidelines", which provide an agreed upon framework by the Nation and the NGS Owners that describes how NGS will be retired and the NGS remediated and restored. The Replacement Lease also contains economic incentives for the Nation that will assist the Nation in

transition its economy if NGS does shut down in December 2019. These incentives include monetary compensation to the Nation's government, NGS assets that may be retained by the Nation to use for economic development, along with access to the NGS transmission systems, which would allow the Nation to develop renewable energy projects on our lands.

The Nation appreciates the opportunity to submit these comments.

Sincerely,

THE NAVAJO NATION

Russell Begaye, *President*

TOHONO O'ODHAM NATION
OFFICE OF THE
CHAIRMAN AND VICE CHAIRMAN

EDWARD D. MANUEL
CHAIRMAN

VERLON M. JOSE
VICE CHAIRMAN

O'ODHAM HA-WEHEJED
"For the People"

June 05, 2017

Via electronic mail (to NGS-EA@eroresources.com)
And U.S. Mail

Leslie A. Meyers
Phoenix Office Area Manager, Lower Colorado Region
Bureau of Reclamation

Ms. Sharon Pinto
Regional Director, Navajo Region
Bureau of Indian Affairs

C/O

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Re: **Public Scoping for an Environmental Assessment Covering Navajo Generating Station Operations Through December 2019 and Retirement Activities Beginning in 2020**

Reference No: **PXAO-1500**
ENV-6.00

Dear Ms. Meyers and Ms. Pinto,

The Tohono O'odham Nation ("Nation") submits these comments in response to the May 23, 2017 Memorandum of the Department of the Interior concerning *Public Scoping for an Environmental Assessment Covering Navajo Generating Station Operations Through December 2019 and Retirement Activities Beginning in 2020*. The Department's Memorandum requests comment on the potential impacts of possible federal decisions related to the operation of the Navajo Generating Station ("NGS")

P.O. BOX 837, SELLS, ARIZONA 85634 PHONE:520.383.2028 FAX:520.383.3379

through the end of December 2019, followed by retirement activities, as well as input regarding alternatives that enable retirement activities to begin after December 2019.

There are many factors that must be considered when looking at the retirement of NGS at the end of 2019. However, before any decision is made on the retirement of NGS it is important for the federal government to consider the cost-effectiveness of power delivery to NGS beneficiaries.

As you know, the Southern Arizona Water Rights Settlement Act of 1982, as amended in 2004, allocates 66,000 acre-feet of Central Arizona Project (CAP) water per year to the Nation. The Department contracts to deliver this settlement water to the Nation through CAP pumping facilities that currently are powered by NGS and paid for in part with funds held in trust for the Nation. Any federal decisions related to the continued operation of NGS, whether through the end of 2019 or beyond, clearly affect the implementation of the Nation's water rights settlement and the United States' trust responsibility to the Nation, and therefore must take into account the cost of power associated with the delivery of the Nation's CAP entitlement.

Thank you for your consideration of these comments. Should you need clarification, please do not hesitate to contact my office or Joshua Rees, Assistant Attorney General, at 520-383-3410.

Sincerely,

Edward D. Manuel, Chairman

7 June 2017

MEMORANDUM

TO: NGS Retirement EA Scoping Comments, ERO Resources Corporation,
1842 Clarkson Street, Denver, CO 80218 Email: NGS-EA@eroresources.com

RE: Comments on the pending changes related to the operation of the Navajo Generating Station (NGS) PXAO-1500/ENV-6.00

FROM: James J. Riley/1

It is my understanding that the current lease for the operation of the NGS coal-fired plant is scheduled to end in December 2019. Additionally, the non-Federal NGS Participants (Current Utility Owners/Lessees) do not intend to operate the plant after that date. Most of the electricity generated by the NGS plant is utilized by the Central Arizona Project (CAP) to distribute Colorado River Water throughout the State of Arizona. Therefore, it should be assumed that the CAP will continue to operate in a similar manner after December 2009, as this water is essential to the residents and corporations in Arizona. CAP provides Colorado River Water to urban and rural areas thereby enabling users to conserve other sources of water (primarily groundwater) for future utilization.

According to the Memorandum from the US Dept. of the Interior, dated 23 May 2017, the pending changes related to the NGS do not affect the continued mining of coal at the Kayenta Mine by the Navajo and Hopi Nations. The operation of the NGS and the mining of coal at the Kayenta Mine provides employment for members of the Nations. Hence, it is in their interest to continue operation of both the NGS and the Kayenta Mine after December 2019.

In an earlier comment submitted by the author dated 14 November 2013 (/2), it was concluded that the state of monitoring technology of air pollution over the Grand Canyon was inadequate to identify precisely any negative impact from the power plant smoke on the visibility. /2 Additionally, while any impacts on the

health of residents was recognized as being outside the purview of the then-current laws governing the operation of the NGS, it was likely that the health impact from NGS smoke was minimal compared to the burning of coal in homes of residents of the Navajo or Hopi Nations. *Therefore, it seems to me, if new agreements are developed to enable the NGS and/or the Kayenta Mine to continue to operate after December 2019, it would be appropriate to address the maintenance or improvement of the health status of the Nations as affected by the burning of coal for power generation or household heating or cooking.*

1/ James J. Riley, Professor Emeritus, Soil, Water and Environmental Science Department, The University of Arizona.

Telephone: (520) 591-4019.

Email: jrjayjay2@gmail.com

Mailing address: 5426 E. 7th St., Tucson, AZ 85711, USA.

2/ Right Topic, Wrong Action—Reducing Haze in the Grand Canyon National Park (submitted 14 November 2013).

Emily Thorn

From: john sliva <jpsliva@hotmail.com>
Sent: Sunday, May 28, 2017 10:16 AM
To: NGS-EA
Subject: comments on NGS

Upon review of the alternatives presented it is apparent to me that there is no feasible economic alternative other than to decommission the NGS asap as proposed by its current owners, and move on with the dismantling of an old technology power plant that should not continue operation for a variety of economic and environmental reasons. Solutions that require subsidizing the price of coal are particularly misguided. Thank you for the opportunity to comment. John Sliva, Flagstaff AZ.

Emily Thorn

From:	Vincent Yazzie <vinceyazzie@yahoo.com>
Sent:	Thursday, May 25, 2017 12:02 PM
To:	NGS-EA
Cc:	Ed Becenti; Eric Frankowski; Nicole Horseherder; Percy Deal; Jihan Gearon; Carol Davis; Lori Goodman; Adella Begaye; John Barth; Robyn Jackson; Jessica Keetso; Nadine Narindrankura; Bill Corcoran; Roger Clark; Kevin Dahl; Sandy Bahr; Taylor McKinnon
Subject:	Kayenta Mine Permit
Attachments:	review_period.JPG

May 25, 2017

Vincent Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Dear Sir,

Somebody check my math. Might be 7/7/2017, that permit review must be completed.

Review period of Kayenta Mine permit has changed. See review_period.pdf Office Surface Mining Resource Enforcement (OSMRE). Instead of ending 7/5/20 the period now ends on 12/22/19.

Permit review must be completed by 10/3/17.

NGS fuel supply being mined beyond the design limits of the draglines. Not safe. Kayenta Mine Permit application needs to be revoked immediately.
https://www.wrcc.osmre.gov/initiatives/kayentaMine/Permit/KPA_Vol1Ch5.pdf

Page 10 of 43 in pdf pages states equipment being used beyond mine depth limits.

Page 15-18 of 43 in pdf pages is the technical specifications of the mine equipment.

A bad let down to operate the Kayenta Mine in an unsafe condition so as to keep water going to CAP. Mine should have been shut down years ago. Reclamation needs to start.

A fuel/service supply truck ran into a scrapper 6 years ago, 2/11/17. Roy Black was killed. If the draglines were digging beyond their design specifications, then people need to be hanged.

https://arlweb.msha.gov/FATALS/2011/ftl11c03.pdf

Permit review must be completed by 10/3/17 and mine equipment being operated beyond design specs creating unsafe mine. Mine must shut down immediately.

Vincent H. Yazzie

§774.10 When must the regulatory authority review a permit after issuance?

(a)(1) The regulatory authority must review each permit issued and outstanding under an approved regulatory program during the term of the permit.
(2) The review required by paragraph (a)(1) of this section must include, but is not limited to, an evaluation of the impacts of the operation on fish, wildlife, and related environmental values in the permit and adjacent areas. The regulatory authority must use that evaluation to determine whether it is necessary to order the permittee to modify the fish and wildlife enhancement plan approved in the permit to ensure that the operation minimizes disturbances and adverse impacts on fish, wildlife, and related environmental values within the permit and adjacent areas to the extent possible using the best technology currently available.
(3) The review required by paragraph (a)(1) of this section must occur not later than the middle of each permit term except that permits with a term longer than 5 years must be reviewed no less frequently than the permit midterm or every 5 years, whichever is more frequent.
(4) Permits granted in accordance with §785.14 of this chapter (mountaintop removal mining) and permits containing a variance from approximate original contour restoration requirements in accordance with §785.16 of this chapter must be reviewed no later than 3 years from the date of issuance of the permit, unless the permittee affirmatively demonstrates that the proposed development is proceeding in accordance with the terms of the permit. This review may be combined with the first review conducted under paragraph (a)(3) of this section if the permit term does not exceed 5 years.
(5) Permits containing an experimental practice approved in accordance with §785.13 of this chapter must be reviewed as set forth in the permit or at least every $2^1/_2$ years from the date of issuance as required by the regulatory authority, in accordance with §785.13(g) of this chapter.
(6) Permits granted in accordance with §785.18 of this chapter (variance for delay in contemporaneous reclamation requirement in combined surface and underground mining operations) must be reviewed no later than 3 years from the date of issuance of the permit. This review may be combined with the first review conducted under paragraph (a)(3) of this section if the permit term does not exceed 5 years.
(b) After a review required by paragraph (a) of this section, or at any time, the regulatory authority may, by order, require reasonable revision of a permit in accordance with §774.13 to ensure compliance with the Act and the regulatory program.
(c) Any order of the regulatory authority requiring revision of a permit must be based upon written findings and is subject to the provisions for administrative and judicial review in part 775 of this chapter. Copies of the order must be sent to the permittee.

(d) Permits may be suspended or revoked in accordance with subchapter L of this chapter.
[81 FR 93325, Dec. 20, 2016]

Mining ends around 12/2019.

Midterm period moves the review requirements to half of four years instead of five.

Review must be completed by 10/3/17.

Emily Thorn

From:	Vincent Yazzie <vinceyazzie@yahoo.com>
Sent:	Tuesday, May 30, 2017 12:18 PM
To:	NGS-EA
Cc:	Ed Becenti; Nicole Horseherder; Eric Frankowski; Percy Deal; Carol Davis; Lori Goodman; Jihan Gearon; Adella Begaye; Robyn Jackson; John Barth; Bill Corcoran; Roger Clark; Kevin Dahl; Sandy Bahr; Taylor McKinnon; Jessica Keetso; Nadine Narindrankura; Earl Tulley
Subject:	0194-17

May 30, 2017

Vincent Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Dear Sir,

Currently, 0194-17 is being commented on and going through the Navajo Nation legislative process to retire NGS, but there are clauses that seek to extend the life of NGS.

Legislation is 519 pages long, but legislative summary and Exhibit A minus corresponding exhibits are only applicable. The rest is boiler plate. Exhibit B is the 1969 Lease Agreement. Exhibit C is the 2013 Lease Amendment. Exhibit A's Exhibits are land surveys. All one has to read is legislative summary and 46 pages in Exhibit A.

Legislative Summary has all inducement money of $110,040,989 over 35 years. Railroad, Lake Pump and Warehouse are worth $162 million, but are we buying for $54,397,500 or $120 million. Looks like NGS Partners want to claw back the taxes since 2011 of the Navajo taxes collected on NGS. Replacement lease does not affirm 50,000 AFY of Upper Basin Colorado River water in the State of AZ to the Navajo Nation.

No regulation of NGS Partners is not acceptable. Other power plants off the reservation get regulated.

NGS partners except LADWP provide coal subsidy of $39,012,562 as coal royalty for 2018, and 2019. A tidy sum of money

Navajo becomes responsible for fly ash pile. To make soap, one mixes water with ash. Liquid removed is called lye, the exact opposite of acid. Lye is mixed with fat to produce soap. Since the ash pile is not lined, eventually lye will reach the Colorado River.

Navajo pays Economic Development cost reimbursable upto $257,500. NGS lease can be surrendered anytime with appropriate compensation demanded.

Navajo Nation law is waivered for Federal and Arizona State law. Navajo courts are cut out.

NGS Partners agree not to sue Navajo and vice versa via waivers. Via waivers in the "Best Interest of the Navajo Nation," NGS partners get to walk away with murder.

Retirement means the removal of NGS assets, excluding the Navajo Nation

21 retained assets, and restoration of the surface of the NGS site.

Navajo could want everything and the remediation could end, but since Amendment One is active and added armor stipulations from the Replacement Lease. Coal mining could continue to 2054.

5. LEASE TERM.

(A) Term. The term of this Lease will commence on December 23,2019 at 12:01 a.m. MST ("Term Commencement Date"), the date on which the Existing Lease ends and is fully extinguished.

(i) Tract A. The Lease Term for Tract A is for thirty-five (35) years and expires on December 22, 2054, without the right of extension.

(ii) Tract B. The Lease Term for Tract B is for thirty-five (35) years and expires on December 22,2054, with one (1) right of extension as referenced below.

(B) Extension of the Lease Term for Tract B. The Lease Term for Tract B shall be extended once for either a 2-Year Extension Period or a 35-Year Extension Period, all as provided for in Section 8 (Further Compensation and Terms and Conditions Related to Tract B) below. The Lease Term, as it relates solely to Tract B and the related §323 Grants, will be extended for the applicable time period provided for in Section 8 (Further Compensation and Terms and Conditions Related to Tract B), commencing on the day immediately following the expiration date of the Lease Term for Tract B, being an expiration date of December 22, 2054 (the "Extension Period"), on the same terms and conditions provided herein, with the exception that the aggregate Lease rental and §323 Grant payments from the

Lessees for the entire Extension Period shall be $10.00 per annum, which may be prepaid or paid in a lump sum at any time by the Lessees. No Extension Period shall apply to Tract A.

Legislative Summary and Exhibit A do not match.

Regular Navajo people cannot sue NGS anymore. There will be no watchdog over NGS. Navajo Nation Council cannot terminate the right of the Navajo people to redress grievances. This is a violation of the Navajo Nation Bill of Rights. This requires that the vote goes to the Navajo People by referendum.

36. WAIVER AND RELEASE OF CLAIMS; COVENANT NOT TO SUE.

(A) To the fullest extent allowed by law, the Nation covenants and agrees not to sue or take administrative action against Lessees and further waives and releases all the claims listed in this Section 36(A), which include legal and equitable claims of any nature, claims for actual compensatory, consequential, punitive, special, multiple or other damages of any kind, whether known or unknown as of the Effective Date, under federal, state, or tribal law, that the Nation may currently have, has ever had, or may have in the future against each of the Lessees. The Nation covenants and agrees not to bring these claims on behalf of the Nation, any political subdivision, any tribal enterprise, tribal business, tribal corporate entity, or on behalf of its tribal members, residents, or any other person, in a representative, agent, or trustee capacity or otherwise. This waiver and release shall apply whether or not the action or the basis therefore are known to the Nation on the Effective Date, so that it waives and releases all rights to any provision of law stating that a general release does not extend to any claims that the person does not know or suspect to exist in the person's favor at the time of executing the release, and which if known to the person would have materially affected the settlement.

There are clauses that NGS Partners can terminate portions of the Replacement Lease and reinstate 1969 Lease and Amended lease with favorable stipulations from Replacement Lease.

NGS would run till 2054, but at heavy cost. Portions of the Replacement will attach to the land forever which is like giving away Navajo land which requires a referendum.

NGS Replacement Lease and associated documents including 0194-17 should not be approved as its out of order and conflicts with the Navajo Nation Bill of Rights.

More disturbing are the waivers to retire NGS could be used extend the life of NGS to 2054 and beyond by disabling laws to reduce the mining cost of the coal to keep NGS running.

Section Eight. Navajo Nation Requests for BIA Waivers and Exceptions under 25

C.F.R. Part 162 and Part 169

A. In accordance with 25 C.P.R. § 162.426(b) and 25 C.P.R. § 169.118(b), the Navajo Nation has determined that the varying compensation and non-monetary compensation the Navajo Nation will receive under the Replacement Lease in relation to both the Leased Premises and in providing the Navajo Nation's consent for any § 323 Grants Lessees shall obtain in relation to the Replacement Lease is in the Navajo Nation's best interest.

B. The Navajo Nation hereby requests a waiver by the Secretary, pursuant to 25 C.P.R. §1.2, ofthe application ofthe following: 25 C.P.R. §§162.014(a)(2) and 162.014(b) and 25 C.P.R. 169.9(b), finding such waivers to be in the Navajo Nation's best interest and hereby stating:

1. The Navajo Nation affirmatively waives the application of the laws of the Navajo Nation, and agrees to the application of federal law and, where federal law does not apply, the laws of the State of Arizona. *See* Replacement Lease, Section 3.

2. The Navajo Nation affirmatively waives the jurisdiction of the Navajo Nation courts and agrees that: (1) the remedies in Sections 17 and 18 of the Replacement Lease are the exclusive remedies to address Disputes among the Parties and claimed breaches of the Replacement Lease; and (2) the federal courts, and, where federal law does not apply, the Arizona state courts, and no other courts, shall have exclusive jurisdiction to consider and

23 decide Disputes or claimed breaches of the Replacement Lease, as provided

24 in Sections 17 and 18 of the Replacement Lease.

25 3. The Navajo Nation affirmatively waives and consents to the wmver of

26 sovereign immunity from suit by the Lessees. *See* Replacement Lease at

27 Section 19.

28 4. The Nation affirmatively covenants that it will not, directly or indirectly,

29 Regulate or attempt to Regulate the Lessees. *See* Replacement Lease at

30 Section 26.

1 C. The Nation hereby gives its consent to the Secretary's waiver and making of

2 exceptions to the following, which the Navajo Nation determines to be in its best

3 interest:

4 1. The waiver by the Secretary, pursuant to 25 C.F.R. §1.2, of the application

5 of the following, in relation to the Replacement Lease and the Navajo

6 Nation's consent for the 323 Grants contained in the Replacement Lease:

7 162.413(d)(l): The Navajo Nation deems the waiver of the
8 requirement that the Replacement Lease require Lessees to hold the
9 United States and the Navajo Nation harmless from any loss,
10 liability, or damages resulting from the Lessees' use or occupation of
11 the Leased Premises to be in the Navajo Nation's best interest.
12 b. 162.413(d)(2): The Navajo Nation deems the waiver of the
13 requirement that the Replacement Lease require Lessees indemnify
14 the United States and the Navajo Nation against all liabilities or costs
15 relating to the use, handling, treatment, removal, storage,
16 transportation, or disposal of hazardous materials, or the release or

discharge of any hazardous material from the Leased Premises that occurs during the Lease Term, regardless of fault, with the exception that the Lessees are not required to indemnify the Navajo Nation for liability or cost arising from the Navajo Nation's negligence or willful misconduct is in the Navajo Nation's best interest.

c. 162.449(b): The Navajo Nation has determined that the waiver of the consent requirements or obtaining BIA's approval of any assignment of the Replacement Lease is in the Navajo Nation's best interest.

d. 169.120(b): The Navajo Nation has determined that waiver of the requirement that NGS Owners be required to pay for all damages to the land for which the right-of-way is granted is in the Navajo Nation's best interest.

e. 169.125(c)(5)(iii): The Navajo Nation has determined that the requirement that the NGS Owners restore the land related to the

rights-of-ways as nearly as may be possible to its original condition, to the extent compatible with the purpose for which the right-of-way was granted, or reclaim the land if agreed to by the Navajo Nation is in its best interest.

f. 169.125(c)(5)(xii): The Navajo Nation has determined that waiver of the valuation requirements of 169.105 is in the Navajo Nation's best interest.

g. 169.125(c)(6)(i): The Navajo Nation deems the waiver of the requirement that the grant of right-of-way require the NGS Owners to hold the United States and the Navajo Nation harmless from any loss, liability, or damages resulting from the use or occupation of the premises to be in the Navajo Nation's best interest.

13 h. 169.125(c)(6)(ii): The Navajo Nation deems the waiver of the

14 requirement that the NGS Owners indemnify the United States and

15 the Navajo Nation against all liabilities or costs relating to the use,

16 handling, treatment, removal, storage, transportation, or disposal of

17 hazardous materials, or the release or discharge of any hazardous

18 material from the premises that occurs during the term of the grant,

19 regardless of fault, with the exception that the NGS Owners are not

20 required to indemnify the Navajo Nation for liability or cost arising

21 from the Navajo Nation's negligence or willful misconduct is in the

22 Navajo Nation's best interest.

23 2. The making of exceptions by the Secretary to the application of the

24 following, in relation to the Replacement Lease and the Navajo Nation's

25 consent for the 323 Grants contained in the Replacement Lease:

26 a. 162.417(c): The Navajo Nation has determined that waiver of the

27 due diligence requirements related to permanent improvements in

28 this subsection is in the best interest of the Navajo Nation.

29 b. 162.428(a): The Navajo Nation has determined that not having

30 compensation reviews and/or adjustments in relation to the

1 compensation received under the Replacement Lease is in the Navajo

2 Nation's best interest.

3 c. 162.413(a)(9) &162.434(±)(2): The Navajo Nation has determined

4 that the waiver of a performance bond or alternative form of security

5 is in its best interest.

6 d. 162.437(c): The Navajo Nation has determined that the waiver ofthe

7 requirement for insurance in this subsection is in the Navajo Nation's

8 best interest.

9 e. 162.420(a): The Navajo Nation hereby states that it has negotiated

10 compensation satisfactory to the Navajo Nation, the Navajo Nation

11 waives valuation and that the Navajo Nation has d etermined that

12 accepting such negotiated compensation and waiving valuation is in

13 its best interest.

14 f. 169.102(b)(6): The Navajo Nation has determined that a waiver of a

15 valuation required under 169.114 is in the Navajo Nation's best

16 interest.

17 g. 169.102(b)(3) & 169.103(±)(2): The Navajo Nation has determined

18 that the waiver of a bond, insurance or alternative form of security is

19 in its best interest.

20 h. 169.105(c): Waiver of the due diligence requirements required in

21 169.105 is in the Navajo Nation's best interest.

22 1. 169.110(a): The Navajo Nation has agreed to compensation that is

23 satisfactory to the Navajo Nation, the Navajo Nation hereby waives

24 valuation, and the Navajo Nation has determined that accepting such

25 agreed-
upon compensation and waiving valuation is in its best

26 interest.

27 D. Amendment No.1 to the Existing Lease

28 1. The Navajo Nation affirmatively covenants that it will not, directly or

29 indirectly, Regulate or attempt to Regulate the Lessees. *See* Section 4 of

30 Amendment No. 1 to the Existing Lease.

1	2.	The Navajo Nation gives its consent to the waiver by the Secretary, pursuant
2		to 25 C.F.R. §1.2, of the application ofthe following regulations in Title 25,
3		Code of Federal Regulations, Part 162: 162.014 (a)(2) and 162.014(b) and
4		deems such a waiver as being in the best interest of the Navajo Nation.
5		

0194-17 defines retirement
Retirement means the removal of NGS assets, excluding the Navajo Nation

21 retained assets, and restoration of the surface of the NGS site.

EA definition of retirement is different from the 0194-17 definition of retirement. Navajo Nation could theoretically take the entire plant and continue burning coal.

The Navajo Nation needs to pay for the full EIS instead of this Environmental Assessment. The waivers could be used for almost unregulated mining at the Kayenta Mine

Vincent H. Yazzie

From:	Vincent Yazzie
To:	NGS-EA
Subject:	Comments
Date:	Friday, June 09, 2017 11:54:33 PM
Attachments:	hpl.JPG dragline_03.JPG

June 9, 2017

Vincent Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Dear Sir,

As the draglines go beyond their design maximum depth, the dozers have to knock down the piles of dirt to keep the dragline bucket from hitting the top of the dirt pile. Such actions waste manpower and puts to much work pressure on them. This has resulted in the death of one miner due to extra people being assigned to knock down hills. As the draglines approach Hopi Partition Lands (HPL), the draglines have to dig deeper which means the Peabody could run out of coal by next year. EA needs to address if Peabody will have enough coal for 2018, and 2019. Coal rank has dropped down to brown coal near HPL. Coal quality needs to be measured.

Full EIS must be implemented.

Vincent H. Yazzie

From:	Vincent Yazzie
To:	NGS-EA
Subject:	Fw: No to 0194-17
Date:	Friday, June 09, 2017 8:53:53 PM
Attachments:	06a.jpg 06a.jpg 06b.jpg 06b.jpg 07.jpg 07.jpg 01.jpg 01.jpg 02a.jpg 02a.jpg 02b.jpg 02b.jpg 03a.jpg 03a.jpg 03b.jpg 03b.jpg 04a.jpg 04a.jpg 04b.jpg 04b.jpg 05a.jpg 05a.jpg 05b.jpg 05b.jpg

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June 9, 2017

Vincent Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Dear Sir,

I would like to incorporate my comments of 0194-17 into the record.
Full EIS must be implemented.

Vincent H. Yazzie
On Thursday, June 8, 2017 2:46 PM, Vincent Yazzie <vinceyazzie@yahoo.com> wrote:

On Thursday, June 8, 2017 2:43 PM, Vincent Yazzie <vinceyazzie@yahoo.com> wrote:

June 6, 2017

Vincent H. Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

(928) 380-3198

e-mail: vinceyazzie@yahoo.com

Executive Director
Office of Legislative Services
P.O. Box 3390
Window Rock, AZ 86515

Subject: No to 0194-17

Dear Honorable Delegates,

NGS Replacement Extension really not necessary. NGS Lease Amendment has Removal of Improvements; Restoration. See Section 14.

Section 6 is Additional Payments for reduction in Net Capacity aka only run 2 units instead of 3 units due to less coal and TWG. NGS owners knew Kayenta had run out of coal for 3 units.

No to 0194-17.

Sincerely,

Vincent H. Yazzie

From: Vincent Yazzie
To: NGS-EA
Subject: Fw: No to 0194-17
Date: Friday, June 09, 2017 8:54:50 PM

June 9, 2017

Vincent Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Dear Sir,

I would like to incorporate my comments of 0194-17 into the record.
Full EIS must be implemented.

Vincent H. Yazzie

On Wednesday, June 7, 2017 9:20 AM, Jessica Keetso <jkeetso@yahoo.com> wrote:

Thank you Vincent for this information.

Sent from my iPhone

On Jun 7, 2017, at 8:14 AM, Vincent Yazzie <vinceyazzie@yahoo.com> wrote:

> On Wednesday, June 7, 2017 7:12 AM, Vincent Yazzie <vinceyazzie@yahoo.com> wrote:
>
> June 7, 2017
>
> Vincent H. Yazzie
> 10080 Palomino Road
> Flagstaff, AZ 86004
>
> (928) 380-3198

e-mail: vinceyazzie@yahoo.com

Executive Director
Office of Legislative Services
P.O. Box 3390
Window Rock, AZ 86515

Subject: No to 0194-17

Dear Honorable Delegates,

On page 8, SRP is required by federal law to specifically follow the rule to deal with Coal Combustion Residuals (CCRs) aka the Ash Pile.

Page 37, NGS has 123,504,000 million construction cost.

On page 2, SRP has $12,397,472,000 in Total Assets.

On page 4, SRP has total Operating Revenues of $3,047,272,000. $648,072,000 purchased in fuel revenue.

No to 0194-17.

Sincerely,

Vincent H. Yazzie

<AuditedFinancials_2016.pdf>

Emily Corsi

From: NGS-EA
Sent: Wednesday, June 21, 2017 2:52 PM
To: Emily Corsi
Subject: FW: Comments 0194-17

-----Original Message-----
From: Vincent Yazzie [mailto:vinceyazzie@yahoo.com]
Sent: Friday, June 09, 2017 8:52 PM
To: NGS-EA
Subject: Fw: Comments 0194-17

June 9, 2017

Vincent Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Dear Sir,

I would like to incorporate my comments of 0194-17 into the record. Full EIS must be implemented.

Vincent H. Yazzie

On Monday, May 29, 2017 8:48 PM, Nicole Horseherder <nhorseherder@gmail.com> wrote:

Thank you Vince

On May 29, 2017 5:02 PM, "Vincent Yazzie" <vinceyazzie@yahoo.com> wrote:

May 29, 2017

Vincent H. Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

(928) 380-3198

e-mail: vinceyazzie@yahoo.com

Executive Director
Office of Legislative Services
P.O. Box 3390
Window Rock, AZ 86515

Subject: No to 0194-17

Dear Honorable Delegates,

Legislation is 519 pages long, but legislative summary and Exhibit A minus corresponding exhibits are only applicable. The rest is boiler plate. Exhibit B is the 1969 Lease Agreement. Exhibit C is the 2013 Lease Amendment. Exhibit A's Exhibits are land surveys. All one has to read is legislative summary and 46 pages in Exhibit A.

Legislative Summary has all inducement money of $110,040,989 over 35 years. Railroad, Lake Pump and Warehouse are worth $162 million, but are we buying for $54,397,500 or $120 million. Looks like NGS Partners want to claw back the taxes since 2011 of the Navajo taxes collected on NGS. Replacement lease does not affirm 50,000 AFY of Upper Basin Colorado River water in the State of AZ to the Navajo Nation.

No regulation of NGS Partners is not acceptable. Other power plants off the reservation get regulated.

NGS partners except LADWP provide coal subsidy of $39,012,562 as coal royalty for 2018, and 2019. A tidy sum of money

Navajo becomes responsible for fly ash pile. To make soap, one mixes water with ash. Liquid removed is called lye, the exact opposite of acid. Lye is mixed with fat to produce soap. Since the ash pile is not lined, eventually lye will reach the Colorado River.

Navajo pays Economic Development cost reimbursable upto $257,500. NGS lease can be surrendered anytime with appropriate compensation demanded.

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NGS Partners agree not to sue Navajo and vice versa via waivers. Via waivers in the "Best Interest of the Navajo Nation," NGS partners get to walk away with murder.

Retirement means the removal of NGS assets, excluding the Navajo Nation

21 retained assets, and restoration of the surface of the NGS site.

Navajo could want everything and the remediation could end, but since Amendment One is active and added armor stipulations from the Replacement Lease. Coal mining could continue to 2054.

5. LEASE TERM.

(A) Term. The term of this Lease will commence on December 23,2019 at 12:01 a.m. MST ("Term Commencement Date"), the date on which the Existing Lease ends and is fully extinguished.

(i) Tract A. The Lease Term for Tract A is for thirty-five (35) years and expires on December 22, 2054, without the right of extension.

(ii) Tract B. The Lease Term for Tract B is for thirty-five (35) years and expires on December 22,2054, with one (1) right of extension as referenced below.

(B) Extension of the Lease Term for Tract B. The Lease Term for Tract B shall be extended once for either a 2-Year Extension Period or a 35-Year Extension Period, all as provided for in Section 8 (Further Compensation and Terms and Conditions Related to Tract B) below. The Lease Term, as it relates solely to Tract B and the related §323 Grants, will be extended for the applicable time period provided for in Section 8 (Further Compensation and Terms and Conditions Related to Tract B), commencing on the day immediately following the expiration date of the Lease Term for Tract B, being an expiration date of December 22, 2054 (the "Extension Period"), on the same terms and conditions provided herein, with the exception that the aggregate Lease rental and §323 Grant payments from the

5599545v15(42000.74)

Page 15 of70

Lessees for the entire Extension Period shall be $10.00 per annum, which may be prepaid or paid in a lump sum at any time by the Lessees. No Extension Period shall apply to Tract A.

Legislative Summary and Exhibit A do not match.

Regular Navajo people cannot sue NGS anymore. There will be no watchdog over NGS. Navajo Nation Council cannot terminate the right of the Navajo people to redress grievances. This is a violation of the Navajo Nation Bill of Rights. This requires that the vote goes to the Navajo People by referendum.

36. WAIVER AND RELEASE OF CLAIMS; COVENANT NOT TO SUE.

(A) To the fullest extent allowed by law, the Nation covenants and agrees not to sue or take administrative action against Lessees and further waives and releases all the claims listed in this Section 36(A), which include legal and equitable claims of any nature, claims for actual compensatory, consequential, punitive, special, multiple or other damages of any kind, whether known or unknown as of the Effective Date, under federal, state, or tribal law, that the Nation may currently have, has ever had, or may have in the future against each of the Lessees. The Nation covenants and agrees not to bring these claims on behalf of the Nation, any political subdivision, any tribal enterprise, tribal business, tribal corporate entity, or on behalf of its tribal members, residents, or any other person, in a representative, agent, or trustee capacity or otherwise. This waiver and release shall apply whether or not the action or the basis therefore are known to the Nation on the Effective Date, so that it waives and releases all rights to any provision of law stating that a general release does not extend to any claims that the person does not know or suspect to exist in the person's favor at the time of executing the release, and which if known to the person would have materially affected the settlement.

There are clauses that NGS Partners can terminate portions of the Replacement Lease and reinstate 1969 Lease and Amended lease with favorable stipulations from Replacement Lease.

NGS would run till 2054, but at heavy cost. Portions of the Replacement will attach to the land forever which is like giving away Navajo land which requires a referendum.

NGS Replacement Lease and associated documents including 0194-17 should not be approved as its out of order and conflicts with the Navajo Nation Bill of Rights.

Sincerely,

Vincent H. Yazzie

ps Need more time to comment

Emily Corsi

From: Emily Corsi
Sent: Wednesday, June 21, 2017 4:38 PM
To: Emily Corsi
Subject: Comments
Attachments: 0194-17_5_reduced.pdf

From: Vincent Yazzie [mailto:vinceyazzie@yahoo.com]
Sent: Friday, June 09, 2017 8:47 PM
To: NGS-EA
Subject: Comments

May 25, 2017

Vincent Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Dear Sir,

Attached is 0194-17, Navajo Replacement Lease. In Exhibit A. Page 14 of 70. Lease Term

5. LEASE TERM.

(A) Term. The term of this Lease will commence on December 23,2019 at 12:01 a.m. MST ("Term Commencement Date"), the date on which the Existing Lease ends and is fully extinguished.

(i) Tract A. The Lease Term for Tract A is for thirty-five (35) years and expires on December 22, 2054, without the right of extension.

(ii) Tract B. The Lease Term for Tract B is for thirty-five (35) years and expires on December 22,2054, with one (1) right of extension as referenced below.

As one can see the 2 year Replacement lease actually extends beyond 2019 to December 22, 2054 for Tract A and Tract B.

This Environmental Assessment(EA) is not appropriate and the Environmental Impact Statement(EIS) must be completed.

Waivers disable many environmental and federal protection of indian resources if the Navajo Nation takes over NGS.

Defininition of Retirement is different in EA than in 0194-17. 0194-17 says retirement is getting rid of everything except what the Navajo Nation keeps which could be the entire power plant. Waivers would reduce regulations on Navajo owned NGS and the Kayenta Mine.

In the legislative summary of 0194-17, Tract A is not renewed which is the NGS power plant.

Full EIS must be implemented.

Vincent H. Yazzie

Emily Corsi

From: Emily Corsi
Sent: Wednesday, June 21, 2017 4:45 PM
To: Emily Corsi
Subject: FW: No to 0194-17

-----Original Message-----
From: Vincent Yazzie [mailto:vinceyazzie@yahoo.com]
Sent: Friday, June 09, 2017 8:50 PM
To: NGS-EA
Subject: Fw: No to 0194-17

June 9, 2017

Vincent Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Dear Sir,

I would like to incorporate my comments of 0194-17 into the record. Full EIS must be implemented.

Vincent H. Yazzie

On Tuesday, June 6, 2017 3:02 AM, Vincent Yazzie <vinceyazzie@yahoo.com> wrote:

June 6, 2017

Vincent H. Yazzie
10080 Palomino Road
Flagstaff, AZ 86004

(928) 380-3198

e-mail: vinceyazzie@yahoo.com

Executive Director
Office of Legislative Services
P.O. Box 3390
Window Rock, AZ 86515

Subject: No to 0194-17

Dear Honorable Delegates,

No to 0194-17 due to Stakeholder lying about how much coal was left for the extension of the 1969 Lease Agreement.

Draft Environmental Impact Statement, Navajo Generating Station-Kayenta Mine Complex Project, Appendix 1A-Synopsis of Documents, page 1A-18 or page 20 of 22 in pdf pages.

https://ngskmc-eis.net/wp-content/uploads/2016/09/appendices/Appendix_1A.pdf

The coal remaining under the Navajo and Hopi coal leases would supply NGS through mid-2041 at historical rates of coal use. The royalty rate and other payment provisions would be subject to periodic adjustment, which would require approval by the Secretary of Interior.

As I remember NGS Participants said they could force lease extension at will, but in reality they could not. NGS participants gave the impression they could do the original 25 year lease extension.

Since NGS Participants could not do the 25 year lease extension, an amended lease extension was with higher lease payments if 3 NGS units were running. There was an option to run 2 units instead of 3 units. NGS participants were secretly laying the groundwork to correct the problem of running out of coal in 2041 by inserting the 2 unit option. Everybody thought NGS would run at 3 units.

In reality, the 3 unit NGS option was not a valid option.

NGS Partners did bait and switch on the Navajo Nation by saying NGS will run for 25 years with 3 units, but an option to run 2 units with reduced royalty. No mention of running out of coal.

NGS Partners committed bait and switch on the Navajo. Section5 of the FTC Act declare unfair or deceptive acts or practices unlawful

No to 0194-17.

Sincerely,

Vincent H. Yazzie

HUNSUCKER
GOODSTEIN
HGNLAW.COM

Anne E. Lynch
Attorney
Phone: 202-895-5380
ALynch@hgnlaw.com

June 23, 2017

VIA CERTIFIED MAIL (RETURN RECEIPT REQUESTED)

Leslie A. Meyers
Phoenix Area Office Manager
Bureau of Reclamation
6150 West Thunderbird Road
Glendale, AZ 85306-4001

Sharon Pinto
Regional Director, Navajo Region
Bureau of Indian Affairs
P.O. Box 1060
Gallup, NM 87305

NGS Retirement EA Scoping Comments
ERO Resources Corporation
1842 Clarkson Street
Denver, CO 80218

Re: The Hopi Tribe's Comments to the Navajo Generating Station Proposed Environmental Assessment

To Ms. Meyers and Ms. Pinto:

This letter serves as a comment, on behalf of the Hopi Tribe (the "Tribe"), to the Bureau of Reclamation ("Reclamation") and Bureau of Indian Affairs ("BIA") on the Public Scoping for an Environmental Assessment covering Navajo Generating Station Operations through December 2019 and Retirement Activities beginning in 2020. We appreciate Reclamation and BIA providing an extension to the Hopi Tribe to provide comments on the scope of the Environmental Assessment ("EA"). The Navajo Generating Station ("NGS") and the associated Kayenta Mine Complex ("KMC") form the pillar of the Hopi economy and provide financial support for critical government functions for the Hopi Tribe and its members. As part of the broad trust obligations the United States owes to the Hopi Tribe, the United States must ensure the Hopi Tribe's interests are protected and support is provided to the Tribe to prevent any short-term or long-term economic disruption to the Hopi Tribe.

The Hopi Tribe requests that Reclamation and BIA consider these comments and concerns during the process of delineating the scope of the EA. We thank you in advance for your attention to the Hopi Tribe's comments and look forward to being actively involved in this project.

In addition to the environmental impacts, the EA should take into account the economic consequences of the proposed action. The National Environmental Policy Act ("NEPA") requires Reclamation and BIA to consider the impact of the action "in

several context such as society as a whole (human, national), the affected region, the affected interests, and the locality." 40 C.F.R. § 1508.27(a). Agencies are required to examine, the "historic, cultural, economic, social, or health [effects], whether direct, indirect, or cumulative." 40 C.F.R. § 1508.8; *see also id.* § 1502.16(a)-(b). *See also Friends of Boundary Waters Wilderness v. Dombeck*, 164 F.3d 1115, 1125-26 (8th Cir. 1999).

The economic importance of NGS and the associated Kayenta Mine Complex ("KMC") to the Hopi Tribe cannot be overstated, as both are crucial to the Hopi Tribe's economy and government services provided by the Tribe to its members. Accordingly, in preparing the EA, the Hopi Tribe requests that the United States, as trustee for the Hopi Tribe, consider the economic impacts that its actions may have on the Hopi Tribe and take proactive steps to plan for any economic disruption.

I. BACKGROUND

A. THE HOPI TRIBE

The Hopi Tribe is located in what is now northeastern Arizona, on a small portion of its ancestral homelands. The Hopi Reservation was established in 1882, adjacent to a reservation for the Navajo Nation that had been established in 1868 and was surrounded on the other three sides by unallocated public domain land. Over the next fifty years, the United States established a patchwork of reservations around the Hopi Reservation, and assigned it to the Navajo Reservation in 1934. Today, the Hopi Reservation is completely surrounded by the Navajo Reservation, effectively cutting the Hopi Reservation off from economic opportunity.

Today, "the Hopi Tribe [has] communities living in extreme poverty." NREL Report at 95. Nearly fifty percent of people on the Hopi Reservation are living in poverty; unemployment is approximately fifty percent; and thirty-five percent of homes on the Hopi Reservation lack a complete kitchen and are more than forty times more likely than the average American home to not have running water. **Attachment A** (ICF International, Analysis of Economic Impacts on the Hopi Tribe and Navajo Nation (Mar. 1, 2010) ("ICF International Study") at 35-36. Sadly, fifty-four percent of children under 18 on the Hopi Reservation are living in poverty. **Attachment B** (U.S. Department of Energy, National Renewable Energy Laboratory, NGS and Air Visibility Regulations: Alternatives and Impacts ("NREL Report")) at 95. The proportion of people living below the poverty line in the Hopi Tribe is more than twice that of the proportion of people in Arizona as a whole. The average annual income for a person living on the Hopi Reservation is nearly half that of the state average. ICF International Study at 35-36.

B. NGS AND KMC

NGS and KMC were established to bring economic stability and opportunity to the region's tribes, including the Hopi Tribe. NGS and KMC directly employ over 900 workers, nearly all Native American. Historically, NGS-related revenues have amounted to approximately 80% of the Hopi Tribe's operating revenue, or approximately $18 million (as compared to revenue from all other Hopi commercial enterprises of $2 million). That money is used to provide critical government services to the Hopi people.

Revenue from NGS and KMC is responsible for approximately 350 Hopi government jobs. Additionally, many Hopi people depend on free coal from Peabody to heat their homes and free water from the mine depot to fill cisterns for their homes and livestock. In an area where many homes lack electricity and/or running water, and approximately 50% of people live below the poverty line, free coal and water are critical resources. *See* ICF International Study.

In addition to direct impacts, NGS and KMC contribute to greater stability for the Hopi economy. NGS and KMC are "anchors of the local economies of the Navajo and Hopi Indian tribes in northern Arizona." *See* NREL Report at 1; **Attachment C** (Letter from DOI to EPA (Mar. 5, 2010) ("DOI Letter")) at 1. NGS is responsible for 1,400 to 1,900 Hopi jobs, accounting for fifty to seventy percent of the employment on the Hopi Reservation. ICF International Study at 41-42.

C. *THE UNITED STATES' TRUST DUTIES*

The United States owes a broad trust obligation to the Hopi Tribe. *See Seminole Nation v. United States*, 316 U.S. 286 (1942). The United States is required to act with "moral obligations of the highest responsibility and trust" in its dealings with Indian Tribes. *Id.* at 296-97. Failure to properly protect the Hopi Tribe's interests constitutes a breach of the United States' trust obligation. The Ninth Circuit has recognized "the trust obligation owed by the United States to the Indian be exercised according to the strictest fiduciary standards" and that "<u>any</u> Federal government action is subject to the United States' fiduciary standards towards the Indian tribes." *See Nance v. EPA*, 645 F.2d 701 (9th Cir. 1981) (emphasis added).

The United States stands in a trust relationship with the Hopi Tribe and owes a fiduciary duty to the Tribe to take actions that do not harm the Tribe's interests, including its economy and functioning government, or assets, including trust assets such as the water, land, and coal resources located on the Hopi Reservation. As described above, NGS provides economic support for the Tribe, largely by purchasing coal and water from the Tribe. The Hopi Tribe has numerous varied interests in ensuring that the United States' actions at NGS and KMC do not result in economic impairment to the

Tribe. If the capacity of the NGS is reduced, the coal and water purchases from the Tribe will likewise decline, resulting in economic impairment to an already suffering economy. Therefore, regardless of the action undertaken by the United States, as part of the broad trust obligations owed to the Hopi Tribe, the United States must ensure that its actions do not create economic impairment to the Hopi Tribe.

II. IMPACTS FROM NGS CLOSURE

The closure of NGS, unless replaced with other industry, will wreak economic devastation on the Hopi Tribe. As outlined above, NGS and KMC contribute significantly to the working revenue of the Hopi Tribe, as well as directly and indirectly provide jobs and stability to the local economy. Now it appears that the owners of NGS have voted to shut the plant down early, frustrating the purpose of NGS. If the revenue is not replaced, the Hopi Tribe's government will effectively be shut down, ICF International Study at 38-39; NREL Report at 98-99, and the Hopi people will be forced to either leave the Hopi Tribe's homeland or plunge deeper into poverty. The EA thus should carefully consider the socioeconomic impacts from the proposed actions, and must evaluate alternatives that could compensate for the shutdown.

Indeed, the United States previously has acknowledged that closure of NGS will result in significant negative socioeconomic impacts for the Hopi Tribe:

> Closure of the NGS and, subsequently, the Kayenta Mine would dramatically increase unemployment for two Tribes – Navajo and Hopi – that already suffer from staggering unemployment. It would also deprive the Hopi Nation of nearly all of its revenue, which could cause it to eliminate basic governmental services and lay off those that have been able to achieve employment with the tribal government. This loss of jobs, and revenues would have concomitant affects throught [sic] the Reservation economy and could ultimately force tribal members and their families to leave their tribal communities in droves, in search of work and other basic needs.

DOI Letter at 1. Therefore, it is essential that, in evaluating the proposed action, the United States, as trustee for the Hopi Tribe, consider the socioeconomic impacts that the proposed action and the various alternatives would have on the Hopi Tribe.

In particular, the United States must ensure any action it proposes for NGS and KMC comply with the fiduciary duty owed to the Tribe and does not impair the Tribe's interests. If an action may impact the Tribe, the United States must take proactive steps to ensure that affected tribes are adequately protected and must proactively mitigate any direct and indirect adverse impacts. In considering the proposed action and the

alternatives, the United States must prevent short-term and long-term impacts to the Hopi Tribe.

In considering the proposed action and alternatives, the United States must investigate the short-term and long-term impacts its decision will have on the Hopi Tribe and must mitigate any potential negative consequences. These investigations should explore various potential scenarios, including but not limited to, consequences from other participants ceasing operations at NGS, the economic consequences of operating only two of the three units at NGS, and the economic impacts of closure of NGS to the Hopi economy in 2044. For each scenario, the United States must ensure that impacts do not jeopardize the ongoing integrity of the Hopi Tribe.

In particular, the EA must consider the socioeconomic impact to the Hopi Tribe of all aspects of the proposed leases and other approvals, including any termination or sunset provisions. The United States must begin planning for the dire economic consequences of the termination of the NGS lease. These economic consequences include, but are not limited to, the immediate loss of employment at NGS and KMC, as well as the loss of community contributions and scholarships provided by NGS and KMC operators to the Hopi Tribe. The Hopi government would lose a major source of contributions, preventing the Tribe from being able to provide basic governmental services to its members. Rising unemployment would likely force Tribe members to leave the Reservation to search for employment opportunities elsewhere.

As an alternative action, the EA should consider mitigating actions, including large-scale solar or wind installations on the Hopi Reservation. The EA should also consider whether conversion of NGS to a natural-gas fired facility is feasible. Proper consideration of the harms and benefits of the various options must be included in any analysis of how to best protect the interests of the Hopi Tribe.

As part of the United States broad trust duty to the Hopi Tribe, the United States must ensure its actions do not harm the Tribe's interests or assets, including trust assets such as coal resources. If any harm to the Hopi Tribe could occur from actions by the United States, the United States must ensure protections are provided to ensure economic impacts are not felt by the Hopi Tribe. The United States must ensure that reductions in plant capacity and corresponding reduction in coal and water purchases from the Tribe are adequately addressed in order to prevent burdening the Tribe and further the staggering unemployment and poverty.

As described above, NGS and KMC form the pillar of the Hopi Tribe’s economy, and any decision concerning NGS will clearly impact the Hopi Tribe. In addition to analyzing the proposed action and the various alternatives in preparing the EA, the United States must analyze the negative consequences each of these actions will have on the Hopi Tribe, and the support the United States will provide to the Hopi Tribe to

mitigate any and all economic impacts from its decisions. These action plans should begin as soon as possible in order to have a system in place for the anticipated cessation of operations at NGS, as well as for the possibility that operations at NGS could suddenly cease depending on the actions of the private owners and operators. Finally, in preparing the EA, the United States should consider whether a hybrid of the proposed action and alternatives would better mitigate economic disruption to the Hopi Tribe.

III. CONSULTATION REQUIREMENTS

As part of the United States' broad trust obligation, the United States has a duty to consult with the Hopi Tribe. In order to fulfill its consultation obligations, the United States must provide an opportunity for meaningful consultation before any decisions are made concerning operations at NGS, including Reclamation's involvement in cessation of operations at NGS. *See Oglala Sioux Tribe of Indians v. Andrus*, 603 F.2d 707 (8th Cir. 1979); *Mescalero Apache Tribe v. Rhoades*, 804 F. Supp. 251 (D.N.M. 1992); *Yankton Sioux Tribe v. Kempthorne*, 442 F. Supp. 2d 774 (D.S.D. 2006); *Lower Brule Sioux Tribe v. Deer*, 911 F. Supp. 395 (D.S.D. 1995); *Winnebago Tribe of Nebraska v. Babbitt*, 915 F. Supp. 157, 167-68 (D.S.D. 1996); *Confederated Tribes and Bands of Yakama Nation v. U.S. Dep't of Ag.*, 2010 WL 3434091, at *4 (E.D. Wash. Aug. 30, 2010); *Klamath Tribes v. United States*, 1996 WL 924509, at *8 (D. Or. Oct. 2, 1996) ("In practical terms, a procedural duty has arisen from the trust relationship such that the federal government must consult with an Indian Tribe in the decision-making process to avoid adverse effects on treaty resources."). "Meaningful consultation means tribal consultation in advance with the decision maker or with intermediaries with clear authority to present tribal views to the . . . decision maker." *Lower Brule Sioux Tribe v. Deer*, 911 F. Supp. 395, 401 (D.S.D. 1995). Meaningful consultation requires "formally soliciting the Tribe's view," "consider[ing] the views expressed," and "tak[ing] them into account in coming to a decision . . . ." *Mescalero Apache Tribe*, 804 F. Supp. at 262.

Presidents have recognized the importance of consulting with Indian Tribes concerning actions that may impact Indian Tribes. In 2000, President Clinton signed Executive Order 13,175, which mandates that:

> To the extent practicable and permitted by law, no agency shall promulgate any regulation that has tribal implications, that imposes substantial direct compliance costs on Indian tribal governments, and that is not required by statute, unless . . . the agency, prior to the formal promulgation of the regulation . . . consulted with tribal officials early in the process of developing the proposed regulation . . . .

Exec. Order 13,175 § 5(c), 65 Fed. Reg. at 67,250. In a Presidential Memorandum to the executive branch agencies, President Obama stated:

> History has shown that failure to include the voices of tribal officials in formulating policy affecting their communities has all too often led to undesirable and, at times, devastating and tragic results. By contrast, meaningful dialogue between Federal officials and tribal officials has greatly improved Federal policy toward Indian tribes. Consultation is a critical ingredient of a sound and productive Federal-tribal relationship.

Presidential Memorandum on Tribal Consultation, 74 Fed. Reg. 57,881 (Nov. 5, 2009). As NGS is a cornerstone of the Hopi economy, these "devastating and tragic results" expressed by President Obama may very well come into fruition if the United States does not fully consider and plan to mitigate any tribal implications from its decisions at NGS.

The Department of the Interior's ("DOI") policies also obligate government-to-government consultation between the Hopi Tribe and DOI. "DOI's Policy on Consultation with Indian Tribes" ("DOI Policy") states that meaningful government-to-government consultation must occur "between appropriate Tribal Officials and Departmental officials," meaning those "who are knowledgeable about the matters at hand, are authorized to speak for the Department, and exercise delegated authority in the disposition and implementation of an agency action." DOI Policy at 2. DOI is required to "notify the appropriate Indian Tribe(s) of the opportunity to consult pursuant to this Policy," and initiate consultation "as early as possible when considering a Departmental Action with Tribal Implications." *Id.* at 7, 11. The DOI Policy also acknowledges an "obligation . . . to engage with Indian Tribes on a government-to-government basis," in order to "honor[] the government-to-government relationship between the United States and Indian Tribes, and compl[y] with the Presidential Memorandum of November 5, 2009, which affirms this relationship and obligates the Department to meet the spirit and intent of EO 13175." *Id.* at 2.

The consultation between the United States and the Hopi Tribe must include meaningful discussion of how to mitigate any direct and indirect short-term and long-term impacts to the Hopi Tribe from the proposed action and alternatives, and the support the United States intends on providing to the Hopi Tribe to prevent economic disruption from its decision. In addition to consulting with the Tribe concerning socioeconomic issues, the United States should consult with the Tribe concerning at least the following issues: cultural resources, traditional cultural beliefs and values, trust assets, air quality, human health and safety, ecological health, water quantity, water quality, environmental concerns, and natural resources concerns. The Hopi Tribe looks forward to discussing the United States' efforts in preparing the EA for the NGS project

and the future of NGS. Please contact the Hopi Tribe to schedule direct government-to-government meetings on this Project.

Very truly yours,
Hunsucker Goodstein PC

/s/ Anne E. Lynch
Anne E. Lynch

Cc (via email): Theresa Thin Elk, General Counsel, Hopi Tribe
Sean Heath, Phoenix Area Office, Bureau of Reclamation
Harrilene Yazzie, Navajo Region, Bureau of Indian Affairs

Appendix D Content Analysis Codes

Table D.1. List of Codes Used for Content Analysis

Issue Category	Issue Code	Sub-issue Code
NEPA Process	NEPA	100
Cooperating Agencies	NEPA	110
Lead Agencies	NEPA	120
Consultation Requirement	NEPA	130
Scoping Process	SCOPE	200
Scoping Process	SCOPE	210
Scope of the Analysis	SCOPE	220
Scope of the Analysis	SCOPE	230
Scope of the Analysis	SCOPE	240
Purpose and Need	PURP	300
Purpose and Need	PURP	310
Purpose and Need	PURP	320
Purpose and Need	PURP	330
Retirement Plan	PLAN	400
Retirement Plan	PLAN	410
Retirement Plan	PLAN	420
Retirement Plan	PLAN	430
No Action Alternative	ALTS	500
No Action Alternative	ALTS	510
Proposed Action	ALTS	520
Alternatives	ALTS	530
Alternatives	ALTS	540
Alternatives	ALTS	550
Alternatives	ALTS	560
Alternatives	ALTS	570
Alternatives	ALTS	580
Data Sources	DATA	600
Air Quality	AIR	700
Climate Change	CLIM	800
Coal Production	COAL	900
Water Quality	WTR	1000
Water Rights	WTR	1010
Water Rights	WTR	1020
Native American Traditional Values	NATV	1100
Native American Traditional Values	NATV	1110
Native American Traditional Values	NATV	1120
Socioeconomics - General Concerns	SOCIO	1200
Socioeconomics - Alternative Energy	SOCIO	1210
Socioeconomics - Native Populations	SOCIO	1220
Socioeconomics - Native Populations	SOCIO	1230
Socioeconomics - Native Populations	SOCIO	1240
Socioeconomics - Native Populations	SOCIO	1250
Socioeconomics - Native Populations	SOCIO	1260
Socioeconomics - Native Populations	SOCIO	1270
Socioeconomics - Native Populations	SOCIO	1280
Socioeconomics - CAP	SOCIO	1290
Socioeconomics - CAP	SOCIO	1295
Environmental Justice	ENJ	1300
Environmental Justice	ENJ	1310
Environmental Justice	ENJ	1320
Visual Resources	VIS	1400
Coal Combustion Waste	CCW	1500
Coal Combustion Waste	CCW	1510

Issue Category	Issue Code	Sub-issue Code
Reclamation and Remediation	RECL	1600
Financial Assurance	RECL	1610
Financial Assurance	RECL	1620
Cumulative Impacts	CUMUL	1700
Cumulative Impacts	CUMUL	1710
Mitigation	MIT	1800
Issues Outside the Scope of the EA	MISC	1900
Issues Outside the Scope of the EA	MISC	1910

Table D.2. Commenter Letter Identification Numbers and Issue Codes

Comment Letter Identification Number	Organization	Issue Categories	Issue Codes/ Sub-issue Codes
S-001	Kinlani Bordertown Dormitory Native American Energy Advocates	Proposed Action, Alternatives, Socioeconomics - Alternative Energy, Socioeconomics - Native Populations	ALTS 520, ALTS 550, SOCIO 1210, SOCIO 1220
S-002	Individual	NEPA Process, Retirement Plan, Coal Combustion Waste	NEPA 100, PLAN 430, CCW 1500
S-003	Dine' Citizens Against Ruining the Environment (Dine'CARE), To' Nizhoni Ani, Grand Canyon Trust, Sierra Club, and National Parks Conservation Association	NEPA Process, Lead Agencies, Scoping Process, Scope of the Analysis, Purpose and Need, Retirement Plan, Alternatives, Air Resources, Climate Change, Water Quality, Water Rights, Socioeconomics - General Concerns, Socioeconomics - Native Populations, Coal Combustion Waste, Reclamation and Remediation, Cumulative Impacts, Mitigation	NEPA 100, NEPA 120, SCOPE 210, SCOPE 220, SCOPE 230, PURP 310, PLAN 410, PLAN 420, ALTS 530, ALTS 560, ALTS 570, AIR 700, CLIM 800, WTR 1010, WTR 1020, SOCIO 1200, SOCIO 1220, SOCIO 1230, SOCIO 1240, SOCIO 1250, SOCIO 1260, SOCIO 1270, SOCIO 1280, CCW 1500, CCW 1510, RECL 1600, CUMUL 1700, MIT 1800
S-004	Pueblo of Zuni (Zuni Tribe of the Zuni Indian Reservation)	Cooperating Agencies, Scope of the Analysis, Purpose and Need, Water Rights, Native American Traditional Values, Environmental Justice	NEPA 110, SCOPE 220, PURP 300, WTR 1020, NATV 1100, NATV 1110, NATV 1120, ENJ 1300
S-005	Travelers Casualty & Surety Company of America	Scope of the Analysis, Environmental Justice, Financial Assurance, Cumulative Impacts	SCOPE 220, ENJ 1300, RECL 1620, CUMUL 1710

Comment Letter Identification Number	Organization	Issue Categories	Issue Codes/ Sub-issue Codes
S-006	The Wilderness Society	NEPA Process, Scoping Process, Scope of the Analysis, Retirement Plan, Water Rights, Socioeconomics - Native Populations, Coal Combustion Waste, Reclamation and Remediation, Cumulative Impacts	NEPA 100, SCOPE 210, SCOPE 220, PLAN 410, PLAN 420, WTR 1020, SOCIO 1240, SOCIO 1250, SOCIO 1260, SOCIO 1270, SOCIO 1280, CCW 1500, RECL 1610, CUMUL 1710
S-007	Individual	No Action Alternative, Socioeconomics - Alternative Energy	ALTS 500, SOCIO 1210
S-008	Gila River Indian Community	Cooperating Agencies, Scope of the Analysis, Purpose and Need, No Action Alternative, Alternatives, Data Sources, Water Rights, Socioeconomics - Native Populations, Socioeconomics - CAP, Environmental Justice	NEPA 110, SCOPE 240, PURP 330, ALTS 510, ALTS 540, ALTS 580, DATA 600, WTR 1010, SOCIO 1270, SOCIO 1290, SOCIO 1295, ENJ 1300, ENJ 1310
S-009	Individual	Alternatives, Visual Resources	ALTS 540, ALTS 550, VIS 1400
S-010	Hopi Tribe	Scoping Process, Environmental Justice	SCOPE 200, ENJ 1300
S-011	Individual	No Action Alternative	ALTS 500
S-012	Black Mesa Trust	Scoping Process, Issues Outside the Scope of the EA	SCOPE 200, SCOPE 210, MISC 1900
S-013	Navajo Nation	Retirement Plan, Proposed Action, Socioeconomics - Native Populations	PLAN 400, ALTS 520, SOCIO 1220
S-014	Tohono O'odham Nation	Water Rights, Socioeconomics - CAP	WTR 1010, SOCIO 1290
S-015	Individual	No Action Alternative, Socioeconomics - Native Populations, Environmental Justice, Visual Resources	ALTS 510, SOCIO 1220, ENJ 1320, VIS 1400
S-016	Individual	No Action Alternative	ALTS 500
S-017	Individual (Repeat Commenter)	Issues Outside the Scope of the EA	MISC 1900

Comment Letter Identification Number	Organization	Issue Categories	Issue Codes/ Sub-issue Codes
S-018	Individual (Repeat Commenter)	NEPA Process, Scope of the Analysis, Retirement Plan, Water Rights, Socioeconomics - Native Populations, Issues Outside the Scope of the EA	NEPA 100, SCOPE 230, PLAN 430, WTR 1010, SOCIO 1230, SOCIO 1250, SOCIO 1260, SOCIO 1280, MISC 1910
S-019	Individual (Repeat Commenter)	NEPA Process, Coal Production	NEPA 100, COAL 900
S-020	Individual (Repeat Commenter)	NEPA Process, Issues Outside the Scope of the EA	NEPA 100, MISC 1910
S-021	Individual (Repeat Commenter)	NEPA Process, Issues Outside the Scope of the EA	NEPA 100, MISC 1910
S-022	Individual (Repeat Commenter)	NEPA Process, Scope of the Analysis, Retirement Plan, Water Rights, Socioeconomics - Native Populations, Issues Outside the Scope of the EA	NEPA 100, SCOPE 230, PLAN 430, WTR 1010, SOCIO 1230, SOCIO 1250, SOCIO 1260, SOCIO 1280, MISC 1910
S-023	Individual (Repeat Commenter)	NEPA Process, Scope of the Analysis, Retirement Plan, Socioeconomics - Native Populations	NEPA 100, SCOPE 230, PLAN 430, SOCIO 1260
S-024	Individual (Repeat Commenter)	NEPA Process, Coal Production, Issues Outside the Scope of the EA	NEPA 100, COAL 900, MISC 1910
S-025	Hopi Tribe	Consultation Requirements, Alternatives, Socioeconomics - Native Populations, Environmental Justice, Mitigations	NEPA 130, ALTS 550, SOCIO 1220, SOCIO 1270, ENJ 1300, MIT 1800

APPENDIX 2: REGULATORY REQUIREMENTS RELATED TO RETIREMENT OF NGS AND ASSOCIATED FACILITIES

Appendix 2

Regulatory Requirements Related to Retirement of NGS and Associated Facilities

(Does not include NEPA, ESA, or NHPA requirements, which are addressed in the EA)

Regulation / Permit	Regulatory Agency	Constituent Regulated	Reporting Requirements	Retirement Actions
Air				
Clean Air Act, Title V Operating Permit (NNEPA)	NNEPA/EPA	Air emissions National Ambient Air Quality Standard (NAAQS)	Quarterly Excess Emissions to EPA and NNEPA; Semiannual Compliance Certifications and Monitoring reports to NNEPA (copy EPA); Annual Emissions Inventory to NNEPA (copy EPA)	1. Continue data collection and reporting up to shutdown date. 2. Notify NNEPA/EPA when shutdown date is finalized and discuss permit closure procedures, final reporting period (including final Emissions Inventory Questionnaire).
Clean Air Act, Title IV, Acid Rain Permit (incorporated into Title V Permit)	NNEPA/EPA	NOx discharge limitations	Quarterly EDR reporting to EPA	1. Continue data collection and reporting until permit is closed. 2. Notify NNEPA/EPA when shutdown date is finalized and discuss permit closure procedures. 3. Notify Energy Information Administration (EIA) when shutdown date is finalized and discuss final reporting procedures.
Greenhouse Gas (GHG) Reporting Program	EPA	Carbon dioxide and other GHG emissions	Annual report to EPA submitted to EPA by March 31 for previous year	1. Continue data collection and reporting through retirement. 2. Notify NNEPA/EPA when shutdown date is finalized and discuss final reporting procedures

Regulation / Permit	Regulatory Agency	Constituent Regulated	Reporting Requirements	Retirement Actions
Clean Air Act, prevention of Significant Deterioration Permit (incorporated into Title V Permit)	EPA	Carbon monoxide (30-day and 12 month rolling averages, NOx (30-day rolling average), visible emissions from PAC silos, vehicle miles traveled associated with CaBr2 and PAC chemical deliveries	Maintain records and notify EPA within 2 working days following the discovery of any failure in air pollution equipment which results in excess emissions. Quarterly reporting of any excess emissions and semi-annual reporting of any permit deviations.	1. Continue data collection and reporting until PSD permit is closed. 2. Notify NNEPA/EPA when shutdown date is finalized and discuss permit closure procedures.
Clean Air Act, Federal Implementation Plan (FIP) for NGS - Best Available Retrofit Technology(BART) and the Regional Haze Rule (RHR)	EPA	NOx	1. By December 1, 2019, notify EPA of applicable alternative (A1, A2, A3, or B) (i.e., TWG alternative). 2. Submit annual report summarizing heat input and annual and cumulative emissions of NOx. 3. Make annual report publicly available on website. 4. Submit application to revise Title V Permit by December 31, 2020.	1. Continue data collection and reporting until Title V permit is closed. 2. Notify EPA when shutdown date is finalized and that TWG alternatives and Title V revision will not be implemented.
Clean Air Act, Mercury and Air Toxic Standards (MATS) controls (request submitted to incorporate into Title V Permit)	NNEPA/EPA	Hazardous air pollutants: mercury, non-mercury metallic toxics, acid gases, and organic air toxics in addition to boiler tune-ups.	Semiannual compliance reports submitted to NNEPA (copy EPA).	1. Continue data collection and reporting until Title V permit is closed. 2. Notify EPA when shutdown date is finalized and that TWG alternatives and Title V revision will not be implemented.

Regulation / Permit	Regulatory Agency	Constituent Regulated	Reporting Requirements	Retirement Actions
Clean Air Act, National Emissions Standards for Hazardous Air Pollutants (NESHAP)	NNEPA See also section on Asbestos landfill in *Hazardous and Solid Waste*	Asbestos	1. EPA Region 9 notifications for scheduled O&M activities that exceed threshold amounts. 2. EPA Region 9 annual notifications to for non-scheduled operations, routine maintenance and repairs. 3. EPA region 9 notifications for demolition activities.	1. Contractors must develop abatement and waste management plans before demolition. 2. Submit notification to NNEPA 10 days prior to demolition/renovation activities; include quantity of asbestos to be abated. 3. Follow applicable abatement and air monitoring regulations.
Federal Implementation Plan, Dust Control Plan (incorporated into Title V Permit)	NNEPA/EPA	Fugitive dust	No reporting required.	1. Notify NNEPA/EPA when shutdown date is finalized and discuss permit closure procedures.
Water				
Safe Drinking Water Act Regulations (SDWA)	EPA	On-site potable water	Total Coliform - monthly report submitted to EPA; Total Organic Carbon – Quarterly reporting; Disinfection By Products and Nitrate – annual reporting ; VOCs, Pesticide and SOCx – every 3 years Sanitary Survey conducted once every 3 years (at minimum), last survey conducted January 7, 2016.	1. Perform EPA Sanitary Survey January 2019. 2. Continue data collection and reporting until potable water system is decommissioned; this system will be necessary at least during asbestos abatement. 3. Notify EPA when shutdown date is finalized.
National Pollution Discharge Elimination System (NPDES) Permit	EPA	Industrial waste discharges	NPDES permit is not required because NGS operates a zero liquid waste discharge system.	Reclamation of existing wastewater ponds may be subject to construction permit for stormwater discharges.

Regulation / Permit	Regulatory Agency	Constituent Regulated	Reporting Requirements	Retirement Actions
Multi-Sector General and Construction Permit for Stormwater Discharges	EPA	Stormwater discharges	Quarterly Discharge Monitoring Reports submitted to EPA. Annual report sent to EPA. MSGP issued for the period June 4, 2015 to June 4, 2020.	1. Continue data collection and reporting up to shutdown. 2. Notify EPA when shutdown date is finalized. 3. Contractors must submit notices of intent (NOIs) to obtain temporary construction general permits (CGPs) for demolition phase 4. After contractor CGPs are in place, the site stormwater permits can be allowed to expire.
316(b) Cooling Water Intake Structure Final Rule	EPA	Impingement & entrainment of aquatic life	If required: 40 CFR 122.21(r) reports 2-8: 2 - Source water physical data 3 - Cooling water intake structure data 4 - Source water baseline biological characterization 5 - Cooling water system data 6 - Chosen method of compliance with impingement mortality standard 7 - Entrainment performance studies 8 - Operational Status	1. Notify EPA when shutdown date is finalized; emphasize that NGS uses mechanical draft cooling towers, which are the best technology available (BTA) for reducing impingement and entrainment.
Clean Water Act, Spill Prevention Control and Countermeasure Plan (SPCCP)	EPA	Obtain permits for work affecting waters of the U.S.; Discharges of oil.	Discharge notification if discharge to Waters of the U.S. occurs sent to EPA	1. Update SPCCP in April 2018. 2. Update SPCCP within 6 months of changes (i.e., tank removal) during retirement. 3. Maintain SPCCP until the total oil storage capacity is < 1320 gallons. 4. Contractor must perform periodic inspections and respond to emergencies while in control of the site.

Regulation / Permit	Regulatory Agency	Constituent Regulated	Reporting Requirements	Retirement Actions
Dam permit ADWR	Dam permit ADWR	Dam north of 60-series ponds	Annual settlement surveys are submitted to ADWR.	1. Submit application to ADWR to remove dam in summer 2017. ADWR has 120 day review period. 2. Respond to ADWR comments within 60 days of receiving initial review. 3. ADWR will complete final design review with 60 days of receiving comments.
Voluntary measure consistent with Arizona Department of Environmental Quality Aquifer Protection Permit and federal requirements of 40 CFR Part 257.	NA	Metals: arsenic barium, cadmium, chromium, fluoride, lead, selenium. Sulfate, total dissolved solids. Oil, grease, total petroleum hydrocarbons, volatile and semi-volatile organic compounds.	No permit required. Ongoing inspections, monitoring, and annual internal reporting. These measures are designed to protect water quality in the regional N-Aquifer. NGS will conduct closure and post closure activities according to GWPP	Implementation of Ground Water Protection Plan (GWPP), including development of a closure plan for ponds and landfills. Implementation of Perched Water Dewatering Work Plan.
Hazardous and Solid Waste				
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Emergency Planning and Community Right to Know Act Regulations	EPA	Reporting hazardous chemical releases and spills. Reporting the amount of hazardous chemicals stored onsite. Reporting annual toxic releases.	Annual Toxic Release Inventory (TRI) Report submitted to EPA by July 1st. Annual Tier II report.	1. Continue data collection and reporting through Retirement. 2. Notify EPA when shutdown date is finalized. 3. Determine data collection and reporting requirements for handoff to Navajo Nation after demolition is complete.

Regulation / Permit	Regulatory Agency	Constituent Regulated	Reporting Requirements	Retirement Actions
Asbestos Landfill Permit	EPA	Asbestos	Current asbestos landfill permitted by EPA in 1993. Records subject to compliance monitoring by the EPA.	Notify the Administrator in writing at least 45 days prior to excavating or otherwise disturbing any asbestos containing waste material that has been deposited at a waste disposal site under this section, and follow the procedures specified in the notification. As necessary, obtain approval of alternate closure and control methods from the Administrator pursuant to 40 CFR §61.151.
Resource Conservation and Recovery Act (RCRA) Regulations	EPA	Solid waste, hazardous waste, universal waste, and used oil.	1. Continue data collection (quantities removed, shipping manifests, etc.) through 2019. 2. Continue to monitor generator status through 2019.	1. Continue data collection (quantities removed, shipping manifests, etc.) through retirement. 2. Continue to monitor generator status through retirement. 3. Notify EPA when shutdown date is finalized. Close solid landfill pursuant to Extension Lease, GWPP, and O&M Plan (See Solid Waste Landfill section) specifications. Monitor pursuant to GWPP and Extension Lease. Construction of new solid waste landfill would not require a Navajo Nation (or EPA) permit, however, Navajo construction specifications would follow the specifications in the Retirement Guidelines and industry standards (e.g.., installation of liners and leachate recovery systems).

Regulation / Permit	Regulatory Agency	Constituent Regulated	Reporting Requirements	Retirement Actions
Toxic Substance and Control Act Regulations	EPA	Use and disposal of polychlorinated biphenyls (PCB). Chemical data reporting.	1. Annual report (for Internal documentation only) 2. PCB 30-day cleanup notification and certification	1. Continue data collection and internal reporting through retirement. 2. Collect PCB characterization samples according to 40 CFR 761.283. 3. Submit PCB cleanup notification and certification at least 30 days prior to cleanup according to 40 CFR 761.61; follow and document PCB disposal and verification testing procedures from same section.
Occupational Safety and Health Administration (OSHA) Regulations	NA	Multiple industry standards for electric power generation, transmission, and distribution	OSHA Form 300A submitted annually.	1. Applicable throughout retirement activities.
Department of Transportation (DOT) Regulations	DOT	Shipment of hazardous waste	3-year document retention for manifests	1. Continue manifest retention through retirement
Resource Conservation and Recovery Act (Subtitle D), Coal Combustion Residuals (CCR)	EPA USEPA published final CCR Rule on April 17, 2015.	Coal Combustion Residuals- Fly ash, bottom ash, FGD scrubber by-product	Extensive reporting requirements from weekly to annually for operations, groundwater monitoring and corrective actions, and closure, and post closure care. All compliance reports will go to the EPA and NNEPA, and will be posted on a publically accessible website. Certified annual fugitive dust plan.	1. Prepare a Landfill Closure Plan per Section 257.102 of CCR Rule and implement other requirements as stated in *Navajo Generating Station: Coal Combustion Residuals Ash Disposal Landfill Requirements (Appendix B of Navajo Project Operation and Maintenance Plan.)* 2. Continue data collection and reporting through retirement. 3. Notify EPA when shutdown date is finalized. 4. Determine data collection and reporting requirements after landfill closure is complete.
U.S. Department of Energy Regulations	USDOE	Submit annual reports on status of operations and environmental equipment	EIA Report submitted to DOE	1. Continue data collection and reporting up to shutdown date. 2. Notify USDOE when shutdown date is finalized.

Regulation / Permit	Regulatory Agency	Constituent Regulated	Reporting Requirements	Retirement Actions
Federal Aviation Administration Obstruction Lighting Requirements	FAA	Lighting used on stacks and facilities more than 200 feet tall.	Notify FAA regarding stack lighting OOS.	1. Notify FAA when stacks are removed.
NRC general license under 10 CFR 31.5	NRC	Radioactive byproduct material - Density / level gauges	1. Perform leak test every 6 months and maintain records. 2. Appoint an individual responsible for compliance and reporting.	1. Continue data collection and reporting up to shutdown date. 2. Notify NRC when shutdown date is finalized. 3. Create a plan to transfer or dispose of byproduct materials according to 10 CFR 31.5; transfer or disposal must be completed within 2 years of shutdown; report all transfers and disposals to NRC.

APPENDIX 3: EXISTING AIR QUALITY FOR THE AFFECTED ENVIRONMENT

Table 3-1. Existing major regional sources and pollutant emissions in the Far-Field air quality analysis area.

Facility	Pollutant Concentration (tons/year)					Latitude	Longitude
	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC		
Arizona Public Service Company - Cholla Power Plant	10,995	6,738	378	361	-	34.940	-110.300
Ash Grove Cement Company: Leamington Cement Plant	1,729	-	-	-	-	39.562	-112.196
Catalyst Paper (Snowflake) Inc.	2,184	2,896	133	110	-	34.504	-110.336
Chemical Lime Nelson Plant	1,103	1,995	300	-	-	35.518	-113.314
Coronado Generating Plant	9,017	7,352	768	594	-	34.578	-109.272
El Paso Natural Gas - Mojave Topock Compressor Station	118	-	-	-	-	34.727	-114.463
El Paso Natural Gas - Williams Compressor Station	915	-	-	-	-	35.311	-112.066
ETC Canyon Pipeline, LLC: San Arroyo Plant	192	-	-	-	-	39.398	-109.124
Four Corners Power Plant[‡]	6,364	12,334	1,438	1,058	15[*]	36.689	-108.480
Genpak Corporation: Polystyrene Foam Production Facility	-	-	-	-	107	37.682	-113.100
Graymont Western Us Incorporated: Cricket Mountain Plant	1,065	-	225	121	-	38.939	-112.817
Intermountain Power Service Corporation: Intermountain Generation Station	25,296	4,937	1,703	1,398	-	39.504	-112.581
Lynndyl, Utah	194	-	-	-	-	39.518	-112.380
Navajo Generating Station[*]	20,468	4,937	2,172	1,502	250	36.904	-111.389
Novo Biopower, LLC	212	-	-	-	-	34.504	-110.336
Pacificorp: Carbon Power Plant	3,665	7,740	633	532	-	39.727	-110.864
Pacificorp: Hunter Power Plant	13,720	4,662	595	349	117	39.173	-111.029
Pacificorp: Huntington Power Plant	6,192	2,531	428	121	-	39.379	-111.080
Patara Midstream, LLC: Lisbon Natural Gas Processing Plant	157	-	-	-	-	38.163	-109.276
Phoenix Cement – Clarkdale, Arizona	716	-	-	-	-	34.780	-112.084
San Juan Generating Station	17,104	4,741	496	438	192	36.802	-108.439
Sunnyside Cogeneration Associates: Sunnyside Cogeneration Facility	421	545	-	-	-	39.548	-110.383
Tucson Electric Power Company - Springerville	6,859	6,050	2,913	2,104	211	34.319	-109.164
Winslow, Arizona	256	-	-	-	-	35.029	-110.716

* NGS emissions and FCPP VOC emissions are from the KM EA (OSMRE 2017a)

[‡] Four Corners Power Plant Emissions are the total combined emissions for Units 4 and 5 from the Four Corners & Navajo Energy Project Final EIS (https://www.wrcc.osmre.gov/initiatives/fourCorners.shtm)

VOC = volatile organic compound

Source: EPA 2011 National Emissions Inventory (https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data)

Table 3-2. Monitoring sites with data from 2011 to 2014 used for the review of regional air quality.

Site	AQS Site ID	State	County	Data Source	Species
Glen Canyon Dam	N/A	AZ	Coconino	SRP	SO_2, $PM_{2.5}$, PM_{10}
McNary	04-001-1003	AZ	Apache	EPA	PM_{10}
Nazlini	04-001-1235	AZ	Apache	EPA	$PM_{2.5}$
Flagstaff Middle School	04-005-1008	AZ	Coconino	EPA	O_3, $PM_{2.5}$
Tuba City	04-005-1237	AZ	Coconino	EPA	PM_{10}
Grand Canyon National Park, W. Rim Drive	04-005-8001	AZ	Coconino	EPA	O_3
Peach Springs	04-015-1000	AZ	Mohave	EPA	PM_{10}
Bullhead City	04-015-1003	AZ	Mohave	EPA	PM_{10}
Grand Canyon West	04-015-1011	AZ	Mohave	EPA	PM_{10}
Petrified Forest National Park	04-017-0119	AZ	Navajo	EPA	O_3
Whiteriver	04-017-1002	AZ	Navajo	EPA	PM_{10}
Mesa Verde National Park	08-083-0101	CO	Montezuma	EPA	O_3
Crownpoint	35-031-1236	NM	McKinley	EPA	PM_{10}
Bloomfield	35-045-0009	NM	San Juan	EPA	NO_2, SO_2, O_3
Farmington	35-045-0019	NM	San Juan	EPA	$PM_{2.5}$, PM_{10}
USBR Shiprock Substation (Farmington)	35-045-1005	NM	San Juan	EPA	NO_2, SO_2, O_3
Dine College, GIS Lab, Shiprock	35-045-1233	NM	San Juan	EPA	PM_{10}
Escalante National Monument	49-017-0004	UT	Garfield	EPA	O_3
Canyonlands National Park	49-037-0101	UT	San Juan	EPA	O_3
Hurricane	49-053-0007	UT	Washington	EPA	O_3, $PM_{2.5}$, PM_{10} (2014 only)
Zion National Park	49-053-0130	UT	Washington	EPA	O_3, $PM_{2.5}$
Glen Canyon Dam	N/A	AZ	Coconino	SRP	SO_2, $PM_{2.5}$
Ignacio	08-067-7001	CO	La Plata	EPA	Used for CO only
Central Phoenix	04-01-39997	AZ	Maricopa	EPA	Used for Pb only

Table 3-3. Regional 1-hour NO_2 air quality from 2011 to 2014.

Site	98th Percentile Value (ppb)								Meets NAAQS? (100 ppb)
	2011		2012		2013		2014		
	Actual	DV*	Actual	DV*	Actual	DV*	Actual	DV*	
Bloomfield	44	N/A	40	N/A	39	41	33	37	Yes
USBR Shiprock Substation	36	37	37	38	38	37	32	36	Yes
Dine College, GIS Lab	34	N/A	37	N/A	32	N/A	N/A	N/A	Yes
Hurricane	19†	N/A	22	N/A	28	N/A	24	N/A	Yes

*DV: Design value, defined as the three-year average of the current year and the previous two years
†In Santa Clara, UT, near Hurricane

Table 3-4. Regional annual NO_2 air quality from 2011 to 2014.

Site	Annual Mean (ppb)				Meets NAAQS? (53 ppb)
	2011	2012	2013	2014	
Bloomfield	13.0	12.8	11.6	11.2	Yes
USBR Shiprock Substation	8.8	5.6	8.0	4.7	Yes
Dine College, GIS Lab	8.0	7.1	6.8	N/A	Yes
Hurricane	3.7*	2.5	3.1	2.6	Yes

*In Santa Clara, UT, near Hurricane

Table 3-5. Regional 1-hour SO_2 air quality from 2011 to 2014.

Site	99th Percentile Value (ppb)								Meets NAAQS? (75 ppb)
	2011		2012		2013		2014		
	Actual	DV*	Actual	DV*	Actual	DV*	Actual	DV*	
Glen Canyon	9	N/A	10	N/A	7	9‡	8	8‡	Yes
Bloomfield	9	7	9	8	8	9	5	7	Yes
USBR Shiprock Substation	20	20	24	19	25	23	14	21	Yes

*DV: Design value, defined as the three-year average of the current year and the previous two years
‡Calculated as a 3-year average of reported yearly 99th percentile values

Table 3-6. Regional 8-hour O_3 air quality from 2011 to 2014.

Site	Fourth Highest Daily Maximum (ppm)								Meets NAAQS? (0.075 ppm prior to 10/1/15; 0.070 ppm subsequently)
	2011		2012		2013		2014		
	Actual	DV*	Actual	DV*	Actual	DV*	Actual	DV*	
Flagstaff	0.068	0.067	0.072	0.069	0.069	0.069	0.073	0.071	Yes‡
Grand Canyon	0.074	0.069	0.073	0.072	0.069	0.072	0.069	0.070	Yes‡
Mesa Verde	0.070	0.068	0.069	0.068	0.069	0.069	0.065	0.067	Yes
Petrified Forest	0.069	0.066	0.073	0.070	0.069	0.070	0.068	0.070	Yes
Bloomfield	0.066	0.061	0.070	0.067	0.069	0.068	0.062	0.067	Yes
USBR Shiprock Substation	0.068	0.063	0.071	0.067	0.065	0.068	0.063	0.066	Yes
Dine College GIS Lab	0.066	N/A	0.071	N/A	0.059	N/A	N/A	N/A	N/A
Escalante	0.037	N/A	0.068	N/A	0.067	N/A	0.060	0.065	Yes
Canyonlands	0.069	0.068	0.072	0.069	0.066	0.069	0.064	0.067	Yes
Hurricane	0.068#	0.067#	0.059	N/A	0.069	N/A	0.066	N/A	Yes
Zion	0.072	0.070	0.075	0.073	0.070	0.072	0.065	0.070	Yes‡

*DV: Design value, defined as the three-year average of the current year and the previous two years
‡Meets 2008 NAAQS, exceeds 2015 NAAQS which is applicable to future ambient air concentrations
#In Santa Clara, UT, near Hurricane

Table 3-7. Regional 24-hour $PM_{2.5}$ air quality from 2011 to 2014.

Site	98th Percentile Value (µg/m³)								Meets NAAQS? (35 µg/m³)
	2011		2012		2013		2014		
	Actual	DV*	Actual	DV*	Actual	DV*	Actual	DV*	
Glen Canyon	7	N/A	9	N/A	43	20‡	23	25‡	Yes
Nazlini	12	N/A	10	N/A	N/A	N/A	9	N/A	N/A
Flagstaff	14	14	12	12	10	12	N/A	N/A	Yes
Peach Springs	5	N/A	11	N/A	14	N/A	10	N/A	N/A
Farmington	12	14	11	14	16	13	11	12	Yes
Zion	12	11	12	11	12	N/A	9	N/A	Yes

*DV: Design value, defined as the three-year average of the current year and the previous two years
‡Calculated as a 3-year average of reported yearly 99th percentile values

Table 3-8. Regional annual $PM_{2.5}$ air quality from 2011 to 2014.

Site	98th Percentile Value (µg/m³)								Meets NAAQS? (15 µg/m³ prior to 1/15/13; 12 µg/m³ subsequently)
	2011		2012		2013		2014		
	Actual	DV	Actual	DV	Actual	DV	Actual	DV	
Glen Canyon	2	N/A	2.8	N/A	12	6*	6	7*	Yes
Nazlini	3.6	N/A	5.4	N/A	N/A	N/A	3.3	N/A	N/A
Flagstaff	5.2	5.9	3.8	5.2	5.4	5.3	N/A	N/A	Yes
Peach Springs	2.9	N/A	4.9	N/A	3.9	N/A	3.1	N/A	Yes
Farmington	4.3	4.5	4.8	4.6	5.3	4.7	4.0	4.5	Yes
Zion	4.6	4.2	6.6	5.1	6.3	N/A	4.0	N/A	Yes

*Calculated as a 3-year average of reported yearly 99th percentile values

Table 3-9. Regional 24-hour PM_{10} air quality from 2011 to 2014.

Site	2nd Highest Maximum (µg/m³)				Meets NAAQS? (150 µg/m³)
	2011	2012	2013	2014	
Glen Canyon	15	23	49	33	Yes
McNary	59	56	54	48	Yes
Flagstaff	37	35	27	N/A	Yes
Tuba City	48	50	N/A	N/A	Yes
Peach Springs	30	51	32	40	Yes
Bullhead City	38	74	86	84	Yes
Grand Canyon	13	39	30	31	Yes
Whiteriver	44	53	46	47	Yes
Crownpoint	47	42	54	N/A	Yes
Farmington	29	32	27	17	Yes
Dine College, GIS Lab	61	52	48	N/A	Yes
Hurricane	N/A	N/A	N/A	34	Yes

Table 3-10. Visibility (Haziness) Records at IMPROVE Sites.

Parameter	Site	Visibility by Year (deciviews)				
		2010	2011	2012	2013	2014
Lowest 20% of Days (least hazy)	Bryce Canyon	1.66	2.00	1.67	1.40	1.16
	Canyonlands	2.74	2.74	3.20	3.37	2.60
	Capitol Reef	2.15	2.89	2.41	2.93	2.12
	Mesa Verde	3.03	3.18	2.73	2.91	2.44
	Grand Canyon	1.87	1.70	2.05	1.37	1.05
	Petrified Forest	4.27	4.03	4.24	3.63	3.37
Average of All Days	Bryce Canyon	5.55	5.28	5.80	5.51	4.89
	Canyonlands	5.78	5.73	6.27	6.32	5.37
	Capitol Reef	5.90	5.83	6.36	6.21	5.38
	Mesa Verde	6.41	6.25	6.42	6.32	5.14
	Grand Canyon	5.43	5.48	5.73	5.13	4.89
	Petrified Forest	7.51	7.51	7.84	6.55	6.36
Highest 20% of Days (haziest)	Bryce Canyon	9.39	10.77	10.46	9.16	8.49
	Canyonlands	10.70	9.91	11.61	10.40	9.14
	Capitol Reef	9.63	9.29	11.79	9.94	9.14
	Mesa Verde	11.78	10.47	11.57	10.58	9.52
	Grand Canyon	9.87	11.65	9.55	9.68	10.10
	Petrified Forest	11.49	11.90	12.10	10.07	10.56
Average	Lowest 20%	2.62	2.76	2.72	2.60	2.12
	Average	6.10	6.01	6.40	6.01	5.34
	Highest 20%	10.48	10.66	11.18	9.97	9.49

Source: IMPROVE network (http://vista.cira.colostate.edu/Improve/)

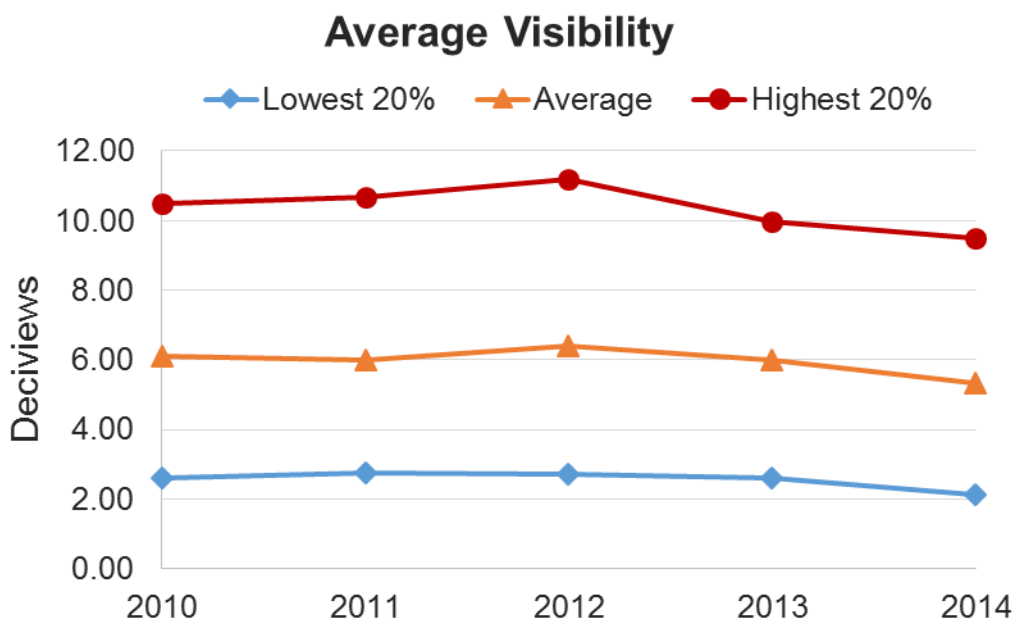

Figure 3-1. Average regional visibility levels (Source: IMPROVE network, http://vista.cira.colostate.edu/Improve/)

APPENDIX 4: NAVAJO NATION G4 LISTED SPECIES POTENTIALLY FOUND IN THE ANALYSIS AREAS

Table 4-1. Navajo Nation G4 listed species potentially found in the analysis areas.

Common Name	Scientific Name	Habitat
Birds		
Sora	*Porzana Carolina*	Wetland habitats with dense emergent vegetation and shallows for foraging
Northern goshawk	*Accipter gentilis*	Mature ponderosa or mixed-conifer forests with high canopy closure and moderately steep slopes
Peregrine falcon	*Falco peregrinus*	Steep cliffs near wetlands, riparian forests, and other forest habitats
Northern saw-whet owl	*Aeoglius acadicus*	Open ponderosa pine, Douglas-fir, or mixed conifer forests
Northern pygmy owl	*Glaucidium gnoma*	Montane forest habitats and wooded canyons
Flammulated owl	*Otus flammeolus*	Open conifer or aspen forests, old-growth stands with dense cover
Burrowing owl	*Athene cunicularia*	Prairie dog colonies, open areas with shortgrass grasslands
Mammals		
Mogollon (Mexican or Navajo Mountain Vole) vole	*Microtus mogollonensis (mexicanus)*	Conifer forests and forest openings, sagebrush, greasewood, or other shrublands with dense grasses
Townsend's big-eared bat	*Corynorhinus townsendii*	Coniferous forests, piñon-juniper woodlands, deciduous riparian woodlands, and desert scrub habitat
Plants		
Rydberg's thistle	*Cirsium rydbergii*	Hanging gardens, seeps, and occasionally streambanks below the hanging gardens, typically between 3,300 and 6,500 feet in elevation
Parish's alkali grass	*Puccinellia parishii*	Open areas (marshes) below perennially flowing alkaline (saline) springs, often in moist soils with a salty crust and without dense vegetation cover

APPENDIX 5: USFWS CONCURRENCE MEMORANDUM DATED OCTOBER 20, 2017

United States Department of the Interior

Fish and Wildlife Service
Arizona Ecological Services Office
9828 North 31st Avenue, C3
Phoenix, Arizona 85051
Telephone: (602) 242-0210 Fax: (602) 242-2513

In Reply Refer to:
AESO/SE
02EAAZ00-2013-I-0333

October 20, 2017

Memorandum

To: Leslie A. Meyers, Area Manager, Bureau of Reclamation, Phoenix, Arizona

From: Field Supervisor

Subject: Navajo Generating Station Extension Lease

Thank you for your correspondence of September 18, 2017, received September 21. This letter documents our review of the Navajo Generating Station (NGS) Extension Lease, in Coconino and Navajo counties, Arizona, in compliance with section 7 of the Endangered Species Act of 1973 (ESA) as amended (16 U.S.C. 1531 et seq.). The bureaus of Reclamation (BOR) and Indian Affairs (BIA) are requesting concurrence with the determinations that the proposed project may affect, but is not likely to adversely affect the bonytail chub (*Gila elegans*) and its critical habitat, Brady pincushion cactus (*Pediocactus bradyi*), Colorado pikeminnow (*Ptychocheilus lucius*) and its critical habitat, Fickeisen plains cactus (*Pediocactus peeblesianus* var. *fickeiseniae*), humpback chub (*Gila cypha*) and its critical habitat, Mexican spotted owl (*Strix occidentalis lucida*), razorback sucker (*Xyrauchen texanus*) and its critical habitat, southwestern willow flycatcher (*Empidonax traillii extimus*), Welsh's milkweed (*Asclepias welshii*), and western yellow-billed cuckoo (*Coccyzus americanus*). We concur with your determinations and provide our rationales below.

Your conclusion also included the determinations that there would be "no effect" on the black-footed ferret (*Mustela nigripes*), California condor (*Gymnogyps californianus*) and its critical habitat, and critical habitat for Fickeisen plains cactus, Mexican spotted owl, southwestern willow flycatcher. Listed species and designated critical habitat with "no effect" determinations do not require review from the Fish and Wildlife Service, and are not addressed further.

This consultation is based on your letter, the accompanying September 15, 2017 biological assessment (BA), ecological risk assessments developed for the NGS Environmental Impact Statement, and conversations between my staff, BOR and the Navajo Nation.

Description of the Proposed Action

A complete description of the proposed action is found in the 2017 BA. The proposed action is federal approvals by BOR and BIA to execute the proposed Extension Lease, to allow for continued coal-fired generation of power at the NGS until December 22, 2019, followed by retirement of most NGS facilities, restoration within five years, and remediation and monitoring for up to 30 more years on Navajo Tribal Trust Lands. The approvals would also allow for the continued operation, maintenance, and replacement of associated transmission systems, the Southern Transmission System (STS) and Western Transmission System (WTS), on Navajo Tribal Trust Lands for 35 years, until December 22, 2054, with one automatic right of renewal to operate for 35 additional years and retire them at the end of that period, or to retire them within 2 years.

The action area is the NGS lease area including the Black Mesa and Lake Powell Railroad Right-of-Way (ROW), water supply facility corridors, that portion of Lake Powell in vicinity of the pump station, landfill, road corridors, coal conveyor and associated facilities, STS and WTS ROW corridors on Navajo Tribal Trust Lands, the Kayenta Mine Permit area, and the N-aquifer. It is also the area potentially affected by chemical deposition from NGS plant stack and secondary emissions, which includes the following areas: (1) lands and waters 20 km (12.4-mi) from the NGS plant site (Near Field); (2) the lower Colorado River below Glen Canyon Dam to the confluence of the Colorado and Little Colorado rivers (Southwest Gap); (3) the Upper Colorado River above Lake Powell to its confluence with the Green River (Northeast Gap); and (4) the San Juan River from State Route 371 Bridge in Farmington, New Mexico, downstream to the San Juan arm of Lake Powell in Arizona (San Juan).

Under the proposed action of this NGS EA, the Kayenta Mine (Mine) would continue to operate under their existing permits to supply the coal required for NGS generation. When NGS operations cease on or before December 22, 2019, it is assumed that closure and reclamation of the Mine also would occur because the NGS is the sole commercial customer of coal produced at the Mine. The Office of Surface Mining (OSM) consulted with us on the operations of the Mine for the Kayenta Mine Permit Renewal (Permit Number AZ-0001E), and we responded with a concurrence letter dated September 19, 2017.

Conservation measures incorporated into the proposal include activities to benefit Colorado pikeminnow in the San Juan River, razorback sucker in the Colorado River below Glen Canyon Dam and in the San Juan River, and humpback chub in the Colorado River below Glen Canyon Dam. These measures would (1) support emergency rapid response to address non-native fish management in the Grand Canyon area of the Colorado River and (2) support transport of Colorado pikeminnow and razorback sucker above the waterfall barrier in the San Juan River.

Conservation measures also include Best Management Practices to minimize or avoid effects on listed species, specifically:

- Implementing avoidance measures where populations of southwestern willow flycatchers could occur, and minimizing construction and vehicle use in riparian areas. If dense riparian vegetation potentially suitable for nesting is located along the transmission lines,

the areas would be surveyed for flycatchers and other listed species prior to maintenance to assure impacts could be minimized or avoided.
- Marking and avoiding or minimizing impacts on biologically sensitive areas and areas where known populations of threatened, endangered, or sensitive species occur.

DETERMINATION OF EFFECTS

The interrelated and interdependent effects associated with the Kayenta Mine have already been addressed in the OSM's consultation with us (consultation number 02EAAZ00-2016-I-0614). The rationale for our concurrences with the OSM's determinations is incorporated by reference, when applicable.

We concur with your determination that the proposed action may affect, but is not likely to adversely affect, the bonytail chub and its critical habitat, Brady pincushion cactus, Colorado pikeminnow and its critical habitat, Fickeisen plains cactus, humpback chub and its critical habitat, Mexican spotted owl, razorback sucker and its critical habitat, southwestern willow flycatcher, Welsh's milkweed, and western yellow-billed cuckoo for the following reasons:

<u>Bonytail chub</u>
- Chemical deposition from NGS emissions would contribute less than 0.000034 micrograms per gram (μg/g) wet weight of mercury to body tissue of any life stage of this species. This tissue burden is well below a concentration that could result in any detectable changes to survivorship, reproduction or behavior. Therefore, effects on the bonytail chub from the indirect effects of coal burning would be insignificant.
- Chemical deposition from NGS emissions would result in no detectable change to water quality. Therefore, effects on the water primary constituent element of designated critical habitat would be insignificant. No other primary constituent elements of critical habitat would be affected.

<u>Brady pincushion cactus</u>
- An ecological risk assessment indicated that deposition from NGS emissions would result in a hazard quotient (HQ) of 0.05 for exposure to chemicals of potential ecological concern. This level is far below the threshold (HQ > 1) at which there could be potential for adverse ecological effects. Therefore, effects on this species from the indirect effects of coal burning would be insignificant.

<u>Colorado pikeminnow</u>
- Chemical deposition from NGS emissions would contribute less than 0.000034 mg/kg wet weight of mercury to body tissue of any life stage of this species. This tissue burden is well below a concentration that could result in any detectable changes to survivorship, reproduction or behavior. Therefore, effects on the Colorado pikeminnow from the indirect effects of coal burning would be insignificant.
- The ecological risk assessment for the San Juan River (Ramboll Environ 2016) indicated that selenium contributions from NGS emissions over a 55-year period would result in critical body residue HQ for Colorado pikeminnow of 0.0001 for selenium. This is well

below a concentration that could result in any detectable changes to survivorship, reproduction, or behavior (an HQ >1).

- Chemical deposition from NGS emissions would result in no detectable change to water quality. Therefore, effects on the water primary constituent element of designated critical habitat would be insignificant. No other primary constituent elements of critical habitat would be affected.

Fickeisen plains cactus

- An ecological risk assessment indicated that deposition from NGS emissions would result in a HQ of 0.05 for exposure to chemicals of potential ecological concern. This level is far below the threshold (HQ > 1) at which there could be potential for adverse ecological effects. Therefore, effects on this species from the indirect effects of coal burning would be insignificant.
- Where this species has the potential to occur along the STS ROW, implementation of BMPs would identify areas for avoidance, and access roads, storage areas and other facilities would be located in areas already disturbed. Therefore, effects on this species would be insignificant and discountable.

Humpback chub

- Chemical deposition from NGS emissions would contribute less than 0.000034 mg/kg wet weight of mercury to body tissue of any life stage of this species. This tissue burden is below a concentration that could result in any detectable changes to survivorship, reproduction or behavior. Therefore, effects on the humpback chub from the indirect effects of coal burning would be insignificant.
- Chemical deposition from NGS emissions would result in no detectable change to water quality. Therefore, effects on the water primary constituent element of designated critical habitat would be insignificant. No other primary constituent elements of critical habitat would be affected.

Mexican spotted owl

- This species has the potential to occur within the action area defined by NGS emissions. The effects of the NGS coal combustion were evaluated in the NGS Near-Field ERA. Results of the ERAs indicate project-related emissions pose negligible risks to the Mexican spotted owl (HQmax < 0.1) (Ramboll Environ 2016). Therefore, the indirect effects of coal burning on this species would be insignificant.

Razorback sucker

- Chemical deposition from NGS emissions would contribute less than 0.000034 μg/g wet weight of mercury to body tissue of any life stage of this species. This tissue burden is below a concentration that could result in any detectable changes to survivorship, reproduction or behavior. Therefore, effects on the razorback sucker from the indirect effects of coal burning would be insignificant.
- The ecological risk assessment for the San Juan River (Ramboll Environ 2016) indicated that selenium contributions from NGS emissions over a 55-year period would result in critical body residue HQs for razorback sucker of 0.0001 for selenium. This is well below

a concentration that could result in any detectable changes to survivorship, reproduction, or behavior (an HQ >1).

- Chemical deposition from NGS emissions would result in no detectable change to water quality. Therefore, effects on the water primary constituent element of designated critical habitat would be insignificant. No other primary constituent elements of critical habitat would be affected.

Southwestern willow flycatcher

- Based on existing habitat and occurrence records, this species is expected to occur rarely within the action area, and primarily during migration or post-breeding dispersal. Implementation of BMPs would minimize or avoid effects. Therefore, effects on this species would be insignificant and discountable.
- The Near-field and Colorado River ERAs indicated that the HQs for this species using were all between one and five orders of magnitude below an HQ of 1 (Ramboll Environ 2016). Therefore, the indirect effects of coal burning on this species would be insignificant.

Welsh's milkweed

- Where this species has the potential to occur along the WTS ROW, implementation of BMPs would identify areas for avoidance, and access roads, storage areas and other facilities would be located in areas already disturbed. Therefore, effects on this species would be insignificant and discountable.
- An ecological risk assessment indicated that deposition from NGS emissions would result in a HQ of 0.05 for exposure to chemicals of potential ecological concern. This level is far below the threshold (HQ > 1) at which there is any potential for adverse ecological effects. Therefore, effects on Welsh's milkweed from the indirect effects of coal burning would be insignificant.

Western yellow-billed cuckoo

- The only known records for this species in the action area are more than 50 miles northeast of the NGS plant along the San Juan River. An ecological risk assessment indicated that deposition from NGS emissions would result in a maximum HQ of less than 0.1 for exposure to chemicals of potential ecological concern. This level is far below the threshold (HQ > 1) at which there is any potential for adverse ecological effects. Therefore, effects on western yellow-billed cuckoo from the indirect effects of coal burning would be insignificant.

When the Fish and Wildlife Service (FWS) enters consultation on a proposed action for which the Bureau of Indian Affairs is a consultation participant, we treat affected American Indian Tribes as license or permit applicants entitled to full participation in the consultation process. This includes, but is not limited to, invitation to meetings between FWS and the action agencies, opportunities to provide pertinent scientific data and review the administrative record, and opportunities to review biological assessments and related documents. In keeping with our trust responsibilities to Tribes, by copy of this memorandum, we are notifying the Hopi Tribe and Navajo Nation, which may be affected by this proposed action.

Thank you for your continued coordination. No further section 7 consultation is required for this project at this time. Should project plans change, or if information on the distribution or abundance of listed species or critical habitat becomes available, this determination may need to be reconsidered. In all future correspondence on this project, please refer to the consultation number 02EAAZ00-2013-I-0333. Should you require further assistance or if you have any questions, please contact John Nystedt at (928) 556-2160 or Brenda Smith at 556-2157 of our Flagstaff Suboffice.

Steven L. Spangle

cc (electronic copy):

Chairman, Hopi Tribe, Kykotsmovi, AZ (Attn: C. Honyumptewa, Natural Resources Department)
President, Navajo Nation, Window Rock, AZ (Attn: Bidtah Becker, Natural Resources Division)
Director, Navajo Nation Department of Fish and Wildlife, Window Rock, AZ
Director, Navajo Regional Office, Bureau of Indian Affairs, Gallup, NM
Director, Western Regional Office, Bureau of Indian Affairs, Phoenix, AZ
NEPA Coordinator, Environmental Services, Navajo Regional Office, Bureau of Indian Affairs, Gallup, NM (Attn: H. Yazzie)
Environmental Specialist, Environmental Services, Western Regional Office, Bureau of Indian Affairs, Phoenix, AZ (Attn: C. Lewis)
Chief, Environmental Resources Management Division, Bureau of Reclamation, Phoenix, AZ (Attn: Sandra Eto)
Director, Environmental Services, Colorado/Western, Peabody Energy, Flagstaff, AZ (Attn: Brian Dunfee)
Chief, Division of Endangered Species, Fish and Wildlife Service, Albuquerque, NM (Attn: S. Jacobsen) (ARD-ES)
Tribal Liaison, Southwest Region, Fish and Wildlife Service, Albuquerque, NM (ARD-EA)
Assistant Field Supervisor, Fish and Wildlife Service, Flagstaff, AZ
Fish and Wildlife Biologist, Fish and Wildlife Service, Flagstaff, AZ (Attn: S. Hedwall)

LITERATURE CITED

Ramboll Environ US Corporation. 2016. NGS San Juan River Ecological Risk Assessment; Environmental Impact Statement summary report for the Navajo Generation Station. Project 06-03922. 585pp.

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APPENDIX 6: COMMENTS RECEIVED AND AGENCIES' RESPONSES

Appendix 6

Public Comments Received and the Agencies' Responses

1.0 Notice of Availability and Public Outreach

On October 5, 2017, Reclamation and BIA (Agencies) sent the Notice of Availability to the project mailing list (approximately 570 hard-copy letters and 360 emails) announcing availability of the EA and Draft FONSI to cover proposed NGS retirement activities beginning in 2020.

The Notice of Availability was also available on Reclamation's website, https://www.usbr.gov/ngs/, and BIA's website, https://www.bia.gov/regional-offices/navajo.

Reclamation and BIA issued a joint press release on October 5, 2017, which was posted to Reclamation's website, https://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=59494, requesting public comments on the EA and Draft FONSI. Both the Notice of Availability and the press release requested public comments on the environmental analysis of potential federal decisions allowing the NGS to operate until the end of 2019 followed by retirement. Comments were due on November 4, 2017 (although all comments received prior to November 17 also have been considered).

2.0 Results

2.1 Comments Received

Public comments were submitted as emails or email attachments to NGS-EA@eroresources.com and as letters sent by fax or postal mail to the Agencies' consultant, ERO Resources Corporation (ERO). This Appendix 6 contains copies of all comment letters received during the public comment period as Attachment 1. Additional documents and attachments that were included with comment letters have not been included in this Appendix 6, but are available in the project record. In total, 10 comment letters and emails were received during the public comment period. **Table 1** and **Table 2**, respectively, provide the affiliation and location of the commenters. **Table 3** provides a summary of the relevant substantive comments on the NGS Extension Lease EA and Draft FONSI and the Agencies' responses. Corrections and clarifications to the EA resulting from comments received have been incorporated into the EA (November 2017) pursuant to 43 CFR § 46.305(b).

Table 1. Commenter Type or Affiliation.

Commenter Type or Affiliation	Number of Comment Submissions
Individual	1 (submitted 5 emails)
Business	1
Public utility	1
Nongovernmental organizations	2 (1 representing 5 groups)
Tribe	5
Total Comments	**10**

Table 2. Commenter Location by State.

Commenter State	Number of Comment Submissions
Arizona	6
Colorado	1
New Mexico	1
Illinois	1
Washington, DC	1
Total Comments	**10**

Table 3. Comment Summary and Agency Responses.

No.	Comment Summary	Resource or Topic	Agency Response
1	The EA fails to carry forward a clean energy alternative suggested in previous scoping comments.	National Environmental Policy Act (NEPA) Process – Alternatives	This alternative was considered but eliminated from evaluation in the EA. An alternative to consider renewable energy resources in place of coal would not meet the Purpose and Need in this EA, which is to enable the retirement of the NGS to occur after the end of the Existing Lease's term on December 22, 2019, and allow for the continued operation and maintenance of the transmission systems after 2019. See Section 2.5.4 of the EA for further information. Additionally, a "clean energy alternative" has not been proposed by the Navajo Nation for use of the tribal lands in question. As outlined in Section 1.2.1 – Purpose and Need, the federal decisions must be consistent with federal Indian policies, including but not limited to tribal self-determination and promoting economic development. The Extension Lease is limited to 2 years of continued coal burning to maintain jobs as long as possible and receive coal royalties. As part of its government-to-government relationship with the Navajo Nation, the NEPA review is limited to the scope of the proposed lease negotiated between the parties. If BIA identifies a preferred alternative that is not consistent with the Navajo Nation's approved lease, it may require the Navajo Nation and the owners to amend the Navajo Nation's approved lease, thereby not meeting the established deadlines, resulting in a multimillion-dollar economic shortfall for the Navajo Nation and Hopi Tribe. In the event the Navajo Nation develops a clean energy activity requiring BIA approval, BIA will complete all appropriate environmental reviews at that time.
2	The NGS must be shut down immediately.	NEPA Process – Alternatives	The No Action alternative, which is evaluated in the EA, analyzes shutdown of the NGS in accordance with the Existing Lease.
3	Reclamation and BIA have worded the EA to intentionally allow for future operation of the NGS beyond December 22, 2019.	NEPA Process – Scope	The Extension Lease prohibits any future coal combustion after December 22, 2019 (see Extension Lease, Recitals, page 5). The EA does not cover combustion after December 22, 2019; therefore, any action to operate the NGS post-2019 would first need to be negotiated with the Navajo Nation and would then require its own environmental compliance. This has been clarified in Section 1.3 of the EA. Furthermore, as stated in the EA in Section 1.3, "The decisions being analyzed in this EA will not (1) authorize coal-fired generation at the NGS after December 2019; (2) authorize additional coal mining at the KM; or (3) limit future decisions about uses of the NGS site if the NGS facilities are retired." See Section 1.3 for additional information.
4	The NGS Extension Lease and OSMRE Kayenta coal mining permit	NEPA Process – Connected Actions	NEPA regulations (40 CFR 1508.25) indicate an action is considered a connected action if (1) the proposed action automatically triggers other actions that may

No.	Comment Summary	Resource or Topic	Agency Response
	renewal are "connected actions" under NEPA and must be evaluated in a single NEPA document (should be an EIS). The EAs are internally inconsistent regarding the timing of mine operations and shutdown of the NGS.		require an EIS; (2) the proposed action cannot or will not proceed unless other actions are taken previously or simultaneously; or (3) the actions are interdependent part of a larger action and depend on the larger action for their justification. (1) As stated in Section 1.1.2 of the EA, the KM must undergo a permit renewal and associated NEPA compliance every 5 years to continue to operate under its existing SMCRA permit. Continuation of the NGS does not require a significant revision to the SMCRA Life of Mine (LOM) permanent permit. (2) Irrespective of the NGS Extension Lease, the KM 5-year renewal was needed to cover operations from July 2015 through the present. Regardless of when NGS operations cease, the KM will continue to operate pursuant to 5-year renewals to deliver coal until not needed and will continue ongoing reclamation activities until all required reclamation is completed. (3) NGS operations and KM mining activities are not interdependent parts of a larger action that depend on the larger action for their justification. The NGS Extension Lease and KM EAs recognize and acknowledge that the NGS and the KM are linked by an agreement for the KM to supply coal for the NGS, and the EAs further recognize that the NGS is the sole customer of KM coal. The actions analyzed in each EA have independent utility despite these NGS-KM relationships. For the NGS, the action analyzed has independent utility from the KM action because it concerns operations that both occur after December 22, 2019, and are independent of coal mining and coal combustion, including parameters for NGS retirement, post-retirement monitoring, and post-retirement transmission use. Post-retirement monitoring of the retired NGS site is particularly noteworthy because post-retirement monitoring is required by regulations promulgated after the execution of the Existing Lease, and the terms of the Existing Lease do not provide options for such monitoring. Even though the Existing Lease does provide options for transmission line use after December 22, 2019, through renewal options and for retirement parameters, the action analyzed has independent utility because it proposes a method of transmission use and retirement that both the Navajo Nation and the NGS owners were willing to propose in lieu of what is contained in the Existing Lease. Finally, the NGS may operate through December 22, 2019, without any federal action (this has been clarified in the EA in Chapter 1, page 1, and Sections 1.2.2 and 2.4).

No.	Comment Summary	Resource or Topic	Agency Response
			The KM 5-year renewal permit also has independent utility from the NGS. As stated in the KM EA: "The renewal of the Kayenta Mine Permit for the 2015-2020 period is an independent SMCRA requirement that does not automatically trigger any action at NGS. The Kayenta Mine Permit Renewal has independent utility from NGS in that operations at Kayenta Mine, including reclamation activities within the boundaries of the existing permit would proceed for the permit renewal period regardless of any potential actions taken at NGS. Justification for the Kayenta Mine Permit Renewal does not depend on any larger action. Therefore, NGS operations are neither a 'connected action' nor part of the proposed action to renew the existing SMCRA permit for a five-year term. Nonetheless, the effects of coal combustion at NGS were considered in the [KM] EA as indirect effects and within the cumulative impact assessment" (KM EA, Appendix H, Response to Comment No. 24.). The actions analyzed in the NGS and KM EAs are very different from the actions analyzed in the NGS-KMC Project DEIS, in which there were connected actions pursuant to NEPA. The actions in the DEIS both involved operations that would occur after the end of the Existing Lease on December 22, 2019. More specifically, Reclamation was required to prepare an EIS to approve the new 25-year lease that would allow the NGS to operate for an additional 25-year period, and, at the same time, OSMRE was required to prepare an EIS to approve a significant LOM revision that was needed in order to guarantee there would be sufficient supplies of coal available to cover the 25-year operating period of the new NGS lease.
5	A Finding of No Significant Impact (FONSI) is not supported by this analysis because there would be significant impacts on cultural resources.	NEPA Process – Decision Document	The information that forms the basis of this comment relates to a prior discovery that has been addressed and is not an issue in this analysis. Cultural resource impacts from previous mining operations on Black Mesa are covered by National Historic Preservation Act Section 106 compliance undertaken and completed during the Black Mesa Archaeological Project and by OSMRE. Potential future cultural resource impacts from mining at the KM would be addressed as described in Section 4.10.1 in the KM EA. The cultural resource impacts described in these comments would not be a result of implementing the Proposed Action of the NGS Extension Lease EA.
6	There are insufficient supplies of coal available; also, the better quality bituminous and subbituminous coal is running out, and the NGS would need to be modified to burn brown coal along with environmental controls.	Affected Environment – inaccurate and/or inadequate information in the EA regarding existing conditions	Comments are noted. As stated in Section 1.1.2 of the EA, an estimated 200 million tons of coal remain to be mined under coal leases held by Peabody Western Coal Company with the Navajo Nation and Hopi Tribe; under the Proposed Action, approximately 16 million tons of coal would be needed through the end of 2019. In addition, the current coal contract between the KM and the NGS stipulates the quality of coal that must be delivered, so that no changes are required for coal combustion operations.

No.	Comment Summary	Resource or Topic	Agency Response
7	The NGS is the single largest contributor to human-made visibility impairment in Class I airsheds.	Affected Environment – inaccurate and/or inadequate information in the EA regarding existing conditions	Your comment is noted. Air quality, including regional haze, was fully analyzed in Section 3.3 in the EA. The NGS is in compliance with all relevant state and federal air quality standards.
8	Operations of the NGS have taken a significant toll on public health and the environment on the Navajo Nation and beyond. Rates of asthma and other respiratory problems are extraordinarily high on the Navajo Nation due, in part, to emissions from the coal plant.	Affected Environment – Public Health and Safety	Limited baseline information is available regarding tribal public health; the best available information was used for the public health analysis for this EA, including the HHRAs prepared for the NGS and the KM and public health records. A human health impacts informational report was prepared by Gradient (2016) for the NGS-KMC EIS to summarize the best available information and science. The report concluded that "viewing the potential health impacts of the NGS and KMC facilities from a variety of perspectives has not identified any substantial elevated risks." In the formal EA mechanism for quantifying potential health risks (i.e., the HHRAs incorporating a suite of specific substances and exposure scenarios of concern), no risk estimates were derived that substantially exceeded target risk levels. Other approaches allowing more in-depth evaluations of specific aspects of potential health impacts also did not yield any substantially elevated exposures or risks, including evaluations of air quality parameters and health status metrics measured in the vicinity of the facilities or other relevant geographic areas.
9	There are unsafe conditions at the NGS, KM, and railroad.	Affected Environment – Public Health and Safety	As stated in Section 3.13.1 of the EA, the NGS must comply with federal and, where applicable, state health and safety laws and regulations. The KM is subject to tribal laws and regulations regarding human health and public safety, as well as federal regulations, such as those regulated by the Mine Safety and Health Administration.
10	The cultural history section is inadequate and continues to portray a Euro-American expansionist perception of history that does not square with the actual historical traumatic reality experienced by Native American people.	Affected Environment – Cultural Resources	Your comments are noted. The purpose of the Affected Environment section is to succinctly describe the environment of the area(s) to be affected by the alternatives under consideration. The description should be no longer than is necessary to understand the effects of those alternatives (40 CFR 1502.15). Continuation of NGS operations for 2 years, and operation and maintenance of transmission lines for an additional 30 years that have been in operation for over 40 years, would result in no new effects.

No.	Comment Summary	Resource or Topic	Agency Response
11	The fate of the coal-fired boilers is not identified, and impacts from dismantling, reconstruction, transportation, and reuse of the boilers at another location are not described.	Environmental Consequences – inadequate impacts analysis	As stated in the EA in Section 2.3.3.1, "The Retirement Plan would consist of detailed plans for the orderly and efficient retirement of NGS structures and facilities not requested to be retained by the Navajo Nation…The Retirement Plan would assure compliance with all applicable federal regulations and industry standards regarding safety and material handling procedures." The boilers would be dealt with as stated in the bullets below this paragraph, to include, "Identify all assets suitable for salvage or recycling, such as scrap metals, operating equipment, spare equipment, warehouse stock, process chemicals and fuels, and catenary railroad equipment."
12	Air quality impacts of coal mining between December 23, 2019, and July 5, 2020, are not analyzed.	Environmental Consequences – inadequate impacts analysis	On page 2-5 of the KM EA, it states, "Mining in [coal resource areas] CRAs N-9, J-19, and J-21 would cease on or before December 22, 2019. On that date, the current authorization for the operation of the NGS would end.... Therefore, mining at the Kayenta Mine would cease and final reclamation would begin. For the purposes of this analysis, it is assumed that mine production would remain constant at 8.1 [million tons per year] mtpy until cessation of operations on or before December 22, 2019." The air quality analysis in the KM EA, and addressed in the NGS Extension Lease EA, is based on these assumptions and therefore only covers 2015 through 2019.
13	KM operations have significantly depleted groundwater resources on the Navajo Nation. The water models need to be updated to reflect there is less recharge to the N-aquifer and to account for water leakage from the N-aquifer to the C-aquifer (water can dissolve weakest rocks), and the interaction between the N-aquifer and C-aquifer that may occur with too many water withdrawals.	Environmental Consequences – inadequate impacts analysis	Groundwater drawdown and recharge were qualitatively analyzed in this EA in Section 3.8.4.2.6, as follows: "…groundwater pumping from the N-Aquifer for mine uses would continue at an estimated rate of 1,200 AFA until mining ceases in 2019. Beginning in 2020, the annual pumping and impacts would be the same as those described for the NGS No Action alternative in Section 3.8.4.1.6 above. Groundwater modeling of the effects of pumping from the KM wellfield predicts that water levels in the N-Aquifer would continue to recover from 2005 elevations near the KM Permit Area through 2019 and then recover at an increasing rate once mining ceases in 2019. Water level recovery in the vicinity of the KM is already estimated to be greater than 20 feet, although drawdown continues. Some leakage to the N-Aquifer would continue to occur from the D-Aquifer, but the effect on N-Aquifer water quality would be 'negligible to minor.'" Section 3.8.4.1.6 of the NGS Extension Lease EA references the KM EA and considers that "withdrawals from the N-Aquifer would be reduced from an annual average rate of 1,200 acre-feet (AF) to about 500 AF [58% reduction] to support reclamation activities for a 3-year period, and further reduced to 100 AFA [92% reduction] for a 10-year period thereafter." The models indicate that there would be more recharge to the system due to the recovery of the groundwater levels resulting from less pumping during the renewal period (KM EA, page 4-46).

No.	Comment Summary	Resource or Topic	Agency Response
			Specifically with regard to any N- and C-Aquifer interaction, the KM EA states: "The two prominent water bearing formations in the C-Aquifer (Kaibab Limestone and Coconino Sandstone) are separated from the N-Aquifer by 1,800 feet of siltstone and claystone in the Chinle and Moenkopi Formations. Because of the thickness and low permeability of the rocks in the Chinle and Moenkopi Formations, and distance below the bottom of the N-Aquifer to the C-Aquifer, hydraulic communication between the N and C-Aquifers is appreciably restricted, and leakage from the N-Aquifer into the C-Aquifer was assumed to be negligible" (KM EA Appendix H, Response to Comment No. 12.).
14	The KM EA indicates heavy metals from NGS' CCR were leaching into groundwater; this is not disclosed in the NGS Extension Lease EA.	Environmental Consequences - inadequate impacts analysis	The KM EA does not indicate heavy metals are leaching into groundwater. On page 4-36, the KM EA states: "The potential indirect effects of CCRs on water resources includes potential infiltration of combustion products into aquifers, potential release by surface runoff flow during precipitation into surface waters, or release into the atmosphere during wind events and subsequent deposition into surface waters." In addition, page 4-42 of the KM EA states, "Due to these protections [regulations and monitoring], the impacts to groundwater quality related to the disposal of CCRs at the NGS under Alternative 1 would be expected to be minor and localized and remediated if required." Furthermore, the NGS O&M Plan, Appendix C – Groundwater Protection Plan, provides historical groundwater quality sampling data for N-aquifer monitoring wells near the Ash Disposal Area, which was also available in the NGS-KMC EIS and KM EA. These data do not indicate any heavy metal contamination of the N-Aquifer.
15	Use of 34,000 AFA of Colorado River water for NGS operations and continued use of N-aquifer water for mining operations are inadequately analyzed in the EA.	Environmental Consequences – inadequate impact analysis	The EA analyzes the impacts from continued use of up to 29,000 acre-feet annually (AFA) in 2018 and 2019, which is about 0.3 percent of the total storage in Lake Powell; it would reduce the surface area by an even smaller percentage (Section 3.8.4.2.1 of the EA). Use of 1,200 AFA of N-Aquifer water would continue for 2 years of mine operations; water levels in the N-Aquifer during this time are expected to continue to recover from 2005 elevations (when pumping to slurry coal from the Black Mesa Mine to Mohave Generating Station ceased) (Section 3.8.4.2.6 of the EA). This rebound would be offset by increased Navajo and Hopi community pumping (Section 3.8.5.5.1 of the EA).
16	Significant emissions of GHG from the NGS and the KM are not assessed, nor has an analysis of SCC been undertaken. A full and complete analysis of the impacts associated with GHG emissions from the NGS and the	Environmental Consequences – inadequate impacts analysis	This comment raises several points concerning greenhouse gas (GHG) emissions and what is commonly known as the "Social Cost of Carbon" (SCC) methodology. These points are addressed below. First, carbon emissions have been considered appropriately in this EA using the best available science. "[T]his EA quantifies direct and indirect GHG emissions and

No.	Comment Summary	Resource or Topic	Agency Response
	KM, existing GHG emissions from historic activity, and the current condition of the site needs to be conducted.		evaluates these emissions in the context of global, U.S., and Arizona GHG emission inventories as discussed in Section 3.4.3.1.1. Based on Section 3.4.4.2, Table 22 provides the percentage of annual GHG emissions for each project component under the Proposed Action in relation to each geographic scale of total emissions" (see Section 3.4.5.1 of the EA). General trends related to climate change in Arizona are identified in Section 3.4.5 of the EA; however, "these local and regional effects cannot be accurately quantified due to the limitations in current climate change models, the complexity of ecosystems, and the effects of natural climate variability over a time frame as short as the Proposed Action for retirement actions. Further, the Proposed Action, including transmission operations, would have a negligible contribution to cumulative effects on climate change and would not contribute cumulatively to climate change effects on local and regional resources" (see Section 3.4.5 of the EA). GHG emissions from the Proposed Action are too small in proportion to global emissions to allow calculation of any measurable change on global climate; thus, they are discussed in the context of global, U.S., and Arizona anthropogenic GHG emissions to portray the qualitative relative contribution under the Proposed Action. The short time frame of the Proposed Action and the global nature of climate change would make these impacts inconsequential at the local and regional levels and not significant. Second, a SCC analysis is not required. The comment acknowledges that Executive Order 13783 withdrew the SCC technical support documents as no longer representative of government policy. Further, the comment and the Congressional Review Service review upon which the comment relies also acknowledge that the SCC methodology was designed for cost-benefit analysis in rulemaking. That is a very different scenario from what is analyzed here, the 2-year operation and retirement of one existing power plant. The Proposed Action does not involve a rulemaking. Additionally, NEPA does not require a cost-benefit analysis (see 40 CFR § 1502.23), and one was not conducted here (see Section 3.4.5.1 of the EA). Third, an SCC analysis is not required because it is not, as described by the CEQ regulations, "essential to a reasoned choice among alternatives." See 40 CFR § 1502.22(a). The EA describes why the SCC methodology "can create large variations to the estimated social cost of carbon" and "does not measure the actual incremental impacts of a project on the environment and does not include all damages or benefits from carbon emissions" (see Section 3.4.5.1 of the EA). These limitations make the SCC methodology "potentially inaccurate and not useful" (see Section 3.4.5.1 of the EA) and therefore unreliable in making a reasoned choice among alternatives. Executive Order 13783, *Promoting Energy Independence and*

No.	Comment Summary	Resource or Topic	Agency Response
			Economic Growth, provides that when monetizing the value of changes in GHG emissions from regulations, agencies shall use discount rates and estimates consistent with OMB Circular A-4 (September 17, 2003). But as described above, this action is not a rulemaking, and accordingly the EA has not attempted to monetize the value of changes in GHG emissions. Rather, the EA quantifies the direct and indirect GHG emissions and evaluates these emissions on a geographic scale. Finally, the comment calls for the creation of a new methodology to assess the social cost of NGS emissions if the SCC protocol is not used. As discussed above, the analysis provided in the EA relies on the best available information and provides the required "hard look" at carbon emissions required by NEPA.
17	The EA ignores or downplays numerous effects on federally and tribally listed endangered and threatened species from extended operation of the NGS-KMC.	Environmental Consequences – inadequate impacts analysis	The 2016 Biological Assessment referenced in the comment was developed for the NGS-KMC EIS and was based on an additional 25 years of NGS operations, whereas the analysis in this EA is based on 2 years of NGS operations. Reclamation and BIA conducted an effects analysis of listed species within the project area based on 2 years of NGS and KM operations; 35-plus years of STS and WTS operations; and NGS, STS, and WTS retirement. Reclamation and BIA made a determination of "may affect, not likely to adversely affect" for 10 federally listed species (including critical habitat for 4 of these species where applicable). Reclamation and BIA initiated informal Section 7 consultation with the USFWS on September 18, 2017. The USFWS responded with a memorandum dated October 20, 2017, in which they concurred with Reclamation's and BIA's determination. This concurrence is Appendix 5 to the NGS Extension Lease EA-November 2017.
18	The EA fails to consider direct, indirect, and cumulative impacts on the "human environment" (defined in 40 CFR 1508.14); Reclamation has not yet demonstrated a good faith effort or due diligence under Section 106 to identify all historic properties, including Zuni traditional cultural properties.	Environmental Consequences – inadequate impacts analysis	Continuation of NGS operations for 2 years, NGS retirement activities for an additional 5 years, and operation and maintenance of transmission lines for an additional 30 years, which have been in operation for over 40 years, would result in no new effects. The majority of the retirement activities are anticipated to occur on previously disturbed areas within the lease site. Reclamation and BIA have initiated consultation with the Navajo Nation Tribal Historic Preservation Officer concerning on-the-ground retirement activities at the NGS site. Ongoing NGS operations would not result in any new land-disturbing activities. Once areas that are anticipated to be disturbed by retirement activities have been identified through the process described in the Extension Lease, a Class III survey will be undertaken as part of the Section 106 consultation. The Section

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			106 consultation would involve coordination with other interested tribes including but not limited to the Hopi Tribe and Pueblo of Zuni. Section 106 consultations would be undertaken prior to any land-disturbing activities. Retirement activities that cannot avoid historic properties would be evaluated for project effects prior to any land-disturbing activities, and any adverse effects would be resolved under a memorandum of agreement among the lead federal agencies, the Navajo Nation, SRP, and appropriate consultation parties. This commitment is included in the EA (see Section 3.14.6 of the EA).
19	The EA does not recognize or give meaningful consideration of Zuni traditional cultural properties, sacred sites, and natural resource concerns. This deficiency can only be remedied through the incorporation and consideration of the required Zuni traditional information on the human/environment relationship and an assessment of the impacts on the natural and cultural resources that are important to Zuni traditional religious and cultural beliefs.	Environmental Consequences – inadequate impacts analysis	The EA was prepared using the best available information that was accessible to describe environmental consequences anticipated to occur as a result of implementing the NGS Extension Lease. In order to remain relevant, initiation of new studies, or completion of studies underway, would not have been practicable. As indicated in the response to Comment #18, the Section 106 consultation would involve coordination with other interested tribes including but not limited to the Hopi Tribe and Pueblo of Zuni. Section 106 consultations would be undertaken prior to any land-disturbing activities. This commitment is included in the EA (see Section 3.14.6 of the EA).
20	Socioeconomic current conditions are inaccurately stated. The cost of coal (production and combustion) is not higher than natural gas prices.	Environmental Consequences – inadequate impacts analysis	As stated in the EA, Section 3.15.4.4.1, the cost of NGS energy exceeds the current energy market prices. As further corroboration, according to the U.S. Department of Energy, *Staff Report on Electricity Markets and Reliability* (August 2017), "the biggest contributor to coal and nuclear plant retirements has been the advantaged economics of natural gas-fired generation." In 2016, natural gas was the largest source of electricity generation in the U.S.—overtaking coal for the first time since data collection began. According to the study, "Production costs of coal…remained somewhat flat, while the new and existing, more flexible, and relatively lower-operating cost natural gas plants drove down wholesale market prices to the point that some formerly profitable nuclear and coal facilities began operating at a loss." In general, coal as a fuel source overall is more expensive because of the total cost of coal-generated electricity, which includes capital, operations and maintenance, and production costs.
21	It is incumbent upon Reclamation to work with the CAP tribes to identify ways to mitigate for the increased costs of CAP water that result from the Extension Lease.	Mitigation	Reclamation would continue to work with the CAP tribes to find ways to moderate the delivery cost of CAP water to the tribes and maintain the viability of the Development Fund.

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22	Please explain what is meant by "Criterion Consideration G by Reclamation" in Table 2, Summary of Environmental Consequences, in reference to compliance with Section 106 of the National Historic Preservation Act.	Mitigation	Criterion G applies to properties that have yet to meet the 50-year marker. Criterion G would be considered for the NGS. Guidance for Criterion G can be found at https://www.nps.gov/nr/publications/bulletins/nrb22/index.htm.
23	Although Reclamation and BIA have known of the Pueblo of Zuni's interest in this undertaking and the importance of the area to the Zuni culture, these two agencies determined it was unnecessary to conduct government-to-government consultation with the Pueblo of Zuni.	Other	On July 21, 2017, Reclamation and BIA sent letters (Certified-Return Receipt Requested) to 13 tribes, including the Pueblo of Zuni, inviting them to participate in government-to-government consultation meetings. No request was received from the Pueblo of Zuni; consultation meetings with eight tribes were held per their requests (see Section 1.4 of the EA).