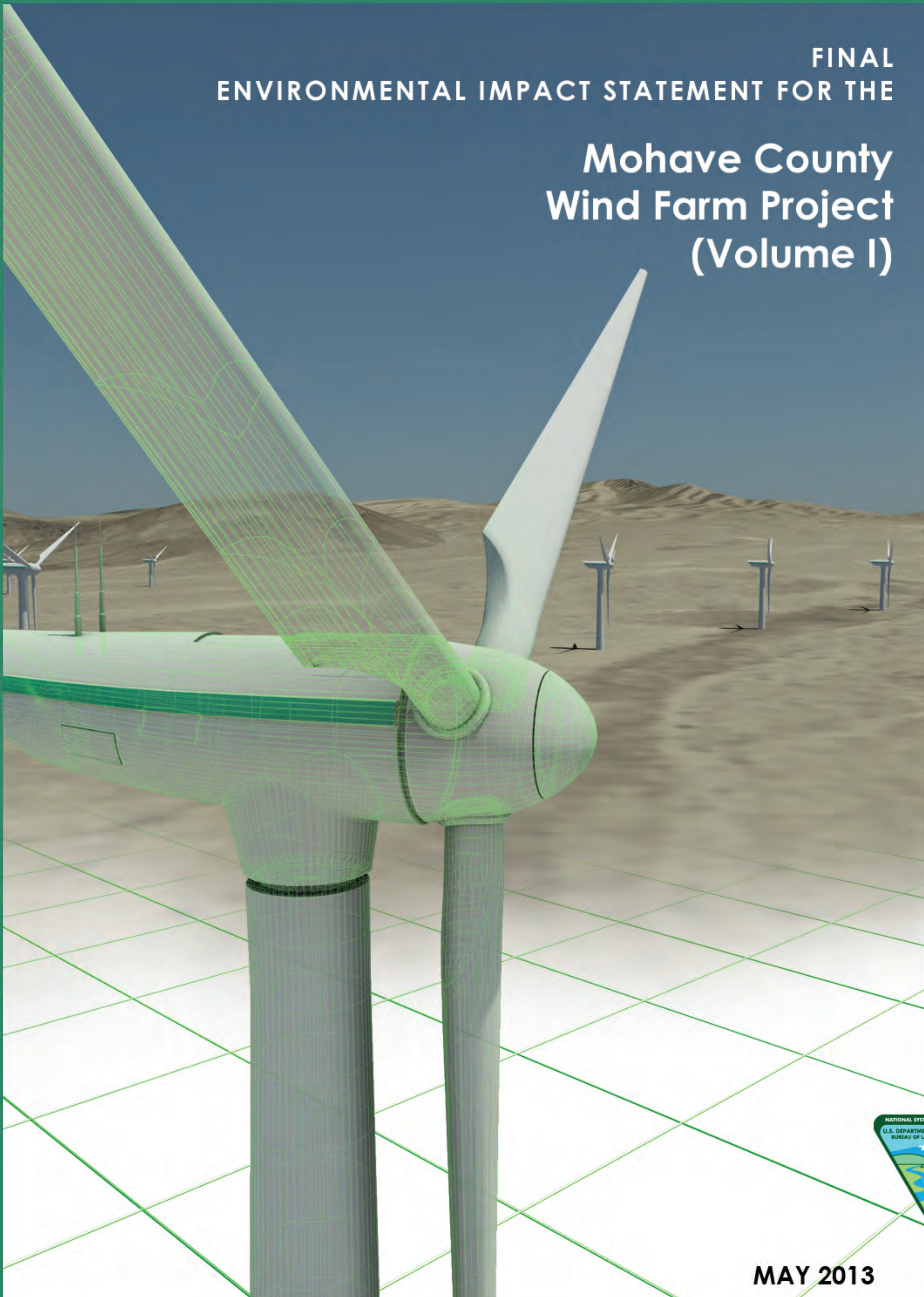
BLM

FINAL
ENVIRONMENTAL IMPACT STATEMENT FOR THE

Mohave County Wind Farm Project (Volume I)



Kingman Field Office / Arizona

MAY 2013

BLM/AZ/PL-13/003

MOHAVE COUNTY WIND FARM PROJECT
MOHAVE COUNTY, ARIZONA
FINAL ENVIRONMENTAL IMPACT STATEMENT

Lead Federal Agency: U.S. Department of the Interior, Bureau of Land Management

Jurisdiction: Colorado River District, Kingman Field Office, Arizona

Cooperating Agencies:
Bureau of Reclamation – Lower Colorado Region
Western Area Power Administration – Desert Southwest Customer Service Region
National Park Service – Lake Mead National Recreation Area
Arizona Game and Fish Commission
Hualapai Tribe – Department of Cultural Resources
Mohave County Arizona – Board of Supervisors

Type of Action:

Draft	( )	Final	(X)
Administrative	(X)	Legislative	( )

For More Information:
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Mohave County Wind Farm FEIS
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ABSTRACT: BP Wind Energy North America Inc., submitted right-of-way applications to the Bureau of Land Management (BLM) and the Bureau of Reclamation (Reclamation) to construct, operate, maintain and decommission a wind energy facility and associated infrastructure in the White Hills area of northwestern Mohave County, Arizona. BP Wind Energy applied to Western Area Power Administration to interconnect the proposed project to one of two transmission lines crossing the Project Area. The proposed wind farm site would occupy 38,099 acres of public land managed by the BLM, Kingman Field Office, and 8,960 acres of Federal land managed by the Reclamation. The proposed Project would produce up to 500 MW of power. This Final Environmental Impact Statement (EIS) analyzes in detail the environmental effects of five alternatives:

- Alternative A – proponent's proposed action
- Alternative B – a reduced wind farm site footprint that encompasses approximately 30,872 acres of BLM-managed land and 3,848 acres of land managed by Reclamation
- Alternative C – a reduced wind farm site footprint that encompasses approximately 30,178 acres of BLM-managed land and 5,124 acres of land managed by Reclamation
- Alternative D –No Action, in which BLM would not authorize construction and operation of the wind energy facility
- Alternative E – a reduced wind farm site footprint that encompasses approximately 35,329 acres of BLM-managed land and 2,781 acres of land managed by Reclamation

These alternatives were developed in response to issues and concerns raised during scoping and in response to comments on the Draft EIS. The agencies' preferred alternative is Alternative E – a reduced footprint that combines elements of Alternatives A and B. BLM, Reclamation, and Western will not issue Records of Decision, making a decision on the Project or interconnection, for at least 30 calendar days following the date the U.S. Environmental Protection Agency publishes its Notice of Availability in the *Federal Register*. For information about the project or to view the Final EIS, visit http://www.blm.gov/az/st/en/prog/energy/wind/mohave.html.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Kingman Field Office
2755 Mission Boulevard
Kingman, Arizona 86401
www.az.blm.gov

April 29, 2013

In Reply Refer To:
2800 (LLAZC01000)
AZA- 32315AA

Dear Reader:

Enclosed is the Final Environmental Impact Statement (EIS) for the proposed Mohave County Wind Farm Project (Project). BP Wind Energy North America Inc., submitted right-of-way applications to the Bureau of Land Management (BLM) and the Bureau of Reclamation (Reclamation) to construct, operate, maintain, and decommission a wind energy facility and associated infrastructure in the White Hills area of northwestern Mohave County, Arizona. BP Wind Energy also applied to Western Area Power Administration to interconnect the proposed Project to one of two transmission lines crossing the Project Area. The proposed wind farm site would occupy up to 38,099 acres of public land managed by the BLM, Kingman Field Office, and 8,960 acres of Federal land managed by Reclamation.

The Final EIS represents a refinement of the Draft EIS in response to public and agency comments. This document was prepared by the BLM as the lead federal agency, in consultation and cooperation with cooperating agencies and in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended; the Council on Environmental Quality and the Department of the Interior (DOI) regulations implementing NEPA (40 CFR Parts 1500-1508, 43 CFR Part 46), and the Federal Land Policy and Management Act of 1976, as amended.

The Final EIS is available for download from the BLM project website at:
http://www.blm.gov/az/st/en/prog/energy/wind/mohave.html

A copy of the Final EIS is also available for review during regular business hours at the following locations:

- BLM Kingman Field Office, 2755 Mission Blvd., Kingman, AZ 86401
- BLM Arizona State Office, One N. Central Ave, Suite 800, Phoenix, AZ 85004
- Boulder City Library, 701 Adams Blvd., Boulder City, NV 89005
- Dolan Springs Community Library, 16140 Pierce Ferry Road, Dolan Springs, AZ 86441
- Kingman Mohave County Library, 3269 North Burbank Street, Kingman, AZ 86402
- Kingman Valle Vista Community Library, 7264 Concho Dr. Ste. B, Kingman, AZ 86401
- Hualapai Cultural Center, 880 W. Route 66, Peach Springs, AZ 86434

Publication of a Notice of Availability (NOA) of a Final EIS does not trigger a formal public comment period. The BLM, however, may choose to review any comments submitted during the 30-day availability period following the Environmental Protection Agency publication of the NOA in the *Federal Register*, and use them to inform the agency's Record of Decision. Please note that the BLM will consider such comments only to the extent practicable and will not respond to comments individually.

You may submit comments by any of the following methods:

KFO_WindEnergy@blm.gov
Mail: Bureau of Land Management, Renewable Energy Coordination Office, Arizona State Office, One North Central Avenue, Suite 800
Phoenix, Arizona 85004-4427

Please identify on the envelopes and the subject line of the email "Mohave County Wind Farm Final EIS."

Before including your address, phone number, email address, or other personal identifying information in your comment, be advised your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. All submissions from organizations and businesses, and from individuals identifying themselves as representatives, or officials of organizations or business, will be available for public inspection in their entirety.

Thank you for your interest in the Project. We appreciate your contribution to this process.

Sincerely,

Ruben Sánchez
Field Manager

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
μg/m^3	micrograms per cubic meter
μPa	microPascal
A.A.C.	Arizona Administrative Code
AADT	Annual Average Daily Traffic
ACC	Arizona Corporation Commission
ACEC	Area of Critical Environmental Concern
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AE	Alternative Energy
AERI	American Eagle Research Institute
AGFD	Arizona Game and Fish Department
AIAN	American Indian-Alaskan Native
AIDTT	Arizona Interagency Desert Tortoise Team
ANPL	Arizona Native Plant Law
ANSI	American National Standards Institute
AP	Airport
APE	area of potential effect
APLIC	Aviation Power Line Interaction Committee
APS	Arizona Public Service Company
AQRV	Air Quality Related Value
AR	Approved Road
AR4	Fourth Assessment Report
ARS	Arizona Revised Statute
ASM	Arizona State Museum
ATV	all-terrain vehicle
AUM	animal unit month
AWLW	Arizona Wildlife Linkages Workgroup
AZ	Arizona
AZGS	Arizona Geological Survey
AzMNH	Arizona Museum of Natural History
AZPDES	Arizona Pollutant Discharge Elimination System
BACT	Best Available Control Technology
BCR	Bird Conservation Region
BCS	Bird Conservation Strategy
BEA	U.S. Bureau of Economic Analysis
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	Best Management Practice
BP Wind Energy	BP Wind Energy North America Inc.
Btu	British thermal unit

CAA	Clean Air Act
CAD	computer-aided design
CDP	Census Designated Place
Census	U.S. Bureau of the Census
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CF	capacity factor
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRMP	Cultural Resource Management Plan
CSWP	crushing, screening and wash plant
dB	decibel
dBA	A-weighted sound level
DEM	Digital Elevation Model
DEUR	Declaration of Use Restriction
DMGP	De Minimis General Permit
DNL	day-night average sound level
DOD	Department of Defense
DOE	Department of Energy
DTI	Department of Trade and Industry
du/ac	dwelling units per acre
DV	deciviews
ECP	Eagle Conservation Plan
EIS	Environmental Impact Statement
EMF	electromagnetic
EMI	electric and magnetic interference
EO	Executive Order
EPAct	National Energy Policy Act of 2005
ERMA	extensive recreation management area
ESA	Endangered Species Act of 1973 (as amended)
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FLPMA	Federal Land Policy Management Act
FPA	Federal Power Act
FTA	Federal Transit Administration
gC_{eq}/kWh	grams of carbon-equivalent per kilowatt-hour of electricity generated
GCNP	Grand Canyon National Park
GHG	greenhouse gases

GIS	geographic information system
GMP	General Management Plan
gpm	gallons per minute
GPS	global positioning systems
GWP	global warming potential
HAP	hazardous air pollutant
HDMS	Heritage Database Management System
NHPA	National Historic Preservation Act
HMA	Herd Management Area
HPTP	Historic Properties Treatment Plan
HSSE	Health, Safety, Security and Environment
Hz	Hertz
I-40	Interstate 40
IAEA	International Atomic Energy Agency
IEC	International Electrotechnical Commission
IM	Instruction Memorandum
IMPLAN	IMpact analysis for PLANning
IPCC	Intergovernmental Panel on Climate Change
ips	inches per second
ISO	International Organization for Standardization
JEDI	Job and Economic Development Impact
KFO	Kingman Field Office
kHz	kilohertz
KOP	key observation points
kV	kilovolt
L/D	Larson-Davis
LAER	Lowest Achievable Emission Rate
L_{dn}	day-night average sound level
L_{eq}	equivalent sound level
LGIA	Large Generator Interconnection Agreement
LGIP	Large Generator Interconnection Procedures
L_{max}	maximum L_{eq}
L_{min}	minimum L_{eq}
LORS	laws, ordinances, regulations and standards
LRR	long-range radar
LUST	leaking underground storage tank
MBTA	Migratory Bird Treaty Act
met tower	meteorological tower
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
mps	meters per second
MRDS	Mineral Resource Data System
MSL	mean sea level
MVA	megavolt-ampere
MW	megawatt

NAAQS	National Ambient Air Quality Standards
NRA	National Recreation Area
National Register	National Register of Historic Places
NEP	non-essential population
NEPA	National Environmental Policy Act
NEXRAD	Doppler radar
NHD	National Hydrography Dataset
NHOPI	Native Hawaiian or Other Pacific Islander
NO	nitrous oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NOA	Notice of Availability
NOAA	U.S. National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOx	nitrogen oxide
NPS	National Park Service
NRA	National Recreation Area
NRCS	Natural Resources Conservation Service
NSPS	New Source Performance Standards
NSR	New Source Review
NTIA	National Telecommunications and Information Administration
NV	Nevada
NVS	Noise and Vibration Study
O&M	Operations and Maintenance
O_3	ozone
OAR	Oregon Administrative Rules
OHV	off-highway vehicle
OSHA	Occupational Safety and Health Administration
Pb	lead
PCB	polychlorinate biphenyl
PEIS	Programmatic Environmental Impact Statement
PFC	proper functioning condition
PFYC	Potential Fossil Yield Classification
PISA	Preliminary Initial Site Assessment
PM_{10}	particulate matter equal to or less than 10 microns in diameter
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in diameter
PPE	personal protective equipment
ppm	parts per million
PPV	peak particle velocity
Project	Mohave County Wind Farm Project
PSD	Prevention of Significant Deterioration
PWL	sound power level
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RDA	Rural Development Area
RDEP	Restoration Design Energy Project

Reclamation	Bureau of Reclamation
REDA	Renewable Energy Development Area
RMP	Resource Management Plan
RMS	root-mean-square
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
Route 66	Historic Route 66
ROW	right-of-way
RSH	rotor swept heights
S	sensitive
SARA 1986	Superfund Amendments and Re-authorization Act of 1986
SARA	Special Activities and Recreation Area
SC	species of concern
SCADA	Supervisory Control and Data Acquisition
SEPIC	Southwest Exotic Plant Information Clearinghouse
SF_6	sulfur hexafluoride
SGCN	Species of Greatest Conservation Need
SGIA	Small Generator Interconnection Agreement
SGIP	Small Generator Interconnection Procedures
SHPO	State Historic Preservation Office
SLA	Sensitivity Level Analysis
SLRU	Sensitivity Level Rating Unit
SO_2	sulfur dioxide
SODAR	sonic detection and ranging system
SPCC	Spill Prevention, Control, and Countermeasure
SPL	sound pressure level
SQRU	Scenic Quality Rating Unit
SR	salvage restricted
SRMA	Special Recreation Management Areas
SRP	Special Recreation Permit
SRREN	Special Report on Renewable Energy Sources and Climate Change Mitigation
SWPPP	Storm Water Pollution Prevention Plan
Tariff	Open Access Transmission Service Tariff
Tool	Preliminary Screening Tool
TPT	transaction privilege tax
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, Disposal
U.S.C.	United States Code
URS	URS Corporation
US 93	U.S. Highway 93
USACE	U.S. Army Corps of Engineers
USBR	Bureau of Reclamation
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USDL	U.S. Department of Labor
USDOT	U.S. Department of Transportation

USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
UST	underground storage tank
VEMUR	Voluntary Environmental Mitigation Use Restriction
VFCE	Valley Fever Center for Excellence
VOC	volatile organic compound
VRI	Visual Resource Inventory
VRM	Visual Resource Management
Western	Western Area Power Administration
WBWG	Western Bat Working Group
WFRHBA	Wild and Free-Roaming Horse and Burro Act
WHO	World Health Organization
WQARF	Water Quality Assurance Revolving Fund
WRCC	Western Regional Climate Center
WSCA	wildlife of special concern in Arizona
WTG	wind turbine generator
WTS	Wind Turbine Syndrome
yd^3	cubic yards

EXECUTIVE SUMMARY

INTRODUCTION

BP Wind Energy North America Inc. (BP Wind Energy) is proposing to construct, operate, maintain, and eventually decommission a wind-powered electrical generation facility in Mohave County, Arizona. The proposed action, the Mohave County Wind Farm Project (Project), would be built in the White Hills of Mohave County about 40 miles northwest of Kingman, Arizona, and just south of Lake Mead National Recreation Area (Map ES-1). The side slopes of the White Hills provide a combination of attributes suitable for wind powered electrical generation facilities, including sufficient wind resource, good physical access, the presence of suitable transmission access, and few known environmental issues.

The Wind Farm Site would include up to approximately 38,099 acres of public land managed by the Bureau of Land Management (BLM) Kingman Field Office (KFO), and approximately 8,960 acres of land managed by the Bureau of Reclamation (Reclamation). Project features within the Wind Farm Site would include, but not be limited to, turbines aligned within corridors, access roads, an operations and maintenance (O&M) building, two temporary laydown/staging areas (with temporary batch plant[1] operations), temporary and permanent meteorological (met) towers, two substations, and electrical collector lines and a transmission line to bring the power to the switchyard[2] that would be operated by the Western Area Power Administration (Western). The switchyard would interconnect to one of the two high-voltage transmission lines that pass through the Wind Farm Site to tie the power generated into the electrical grid.

Project features outside of the Wind Farm Site include the primary access road, a materials source, a temporary water pipeline, and an electrical power distribution line. An approximately 3-mile long access road would be constructed between US Highway 93 (US 93) and the Wind Farm Site. The materials source for access road aggregate and for mixing concrete for foundations would be from the existing Detrital Wash Materials Pit (Materials Source), located near US 93 and along the proposed access road. Existing water wells in the vicinity of the Materials Source would provide water during construction via a temporary pipeline located along the access road right-of-way (ROW) to one of the temporary batch plants within the Wind Farm Site. A well at the O&M building also may be used as a source of water during construction. Power for batch plant operations would be provided by either an on-site generator or a distribution line that would tap into an existing Unisource Energy power line south of the Project Area and brought to the site along road ROWs; if a distribution line carries power to the batch plant near the primary access road, it would be retained through operations to provide power to the O&M building. The public lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

The National Environmental Policy Act (NEPA) directs every federal agency to prepare a detailed study of the effects of "major federal actions significantly affecting the quality of the human environment." BLM is responsible for reviewing and processing applications for ROWs on public lands in accordance with the Federal Land Policy and Management Act (FLPMA). BLM is authorized to issue ROWs for "systems for generation, transmission, and distribution of energy…" per FLPMA Section 1761(a)(4). A ROW grant is a Federal action that requires the completion of environmental reviews pursuant to NEPA.

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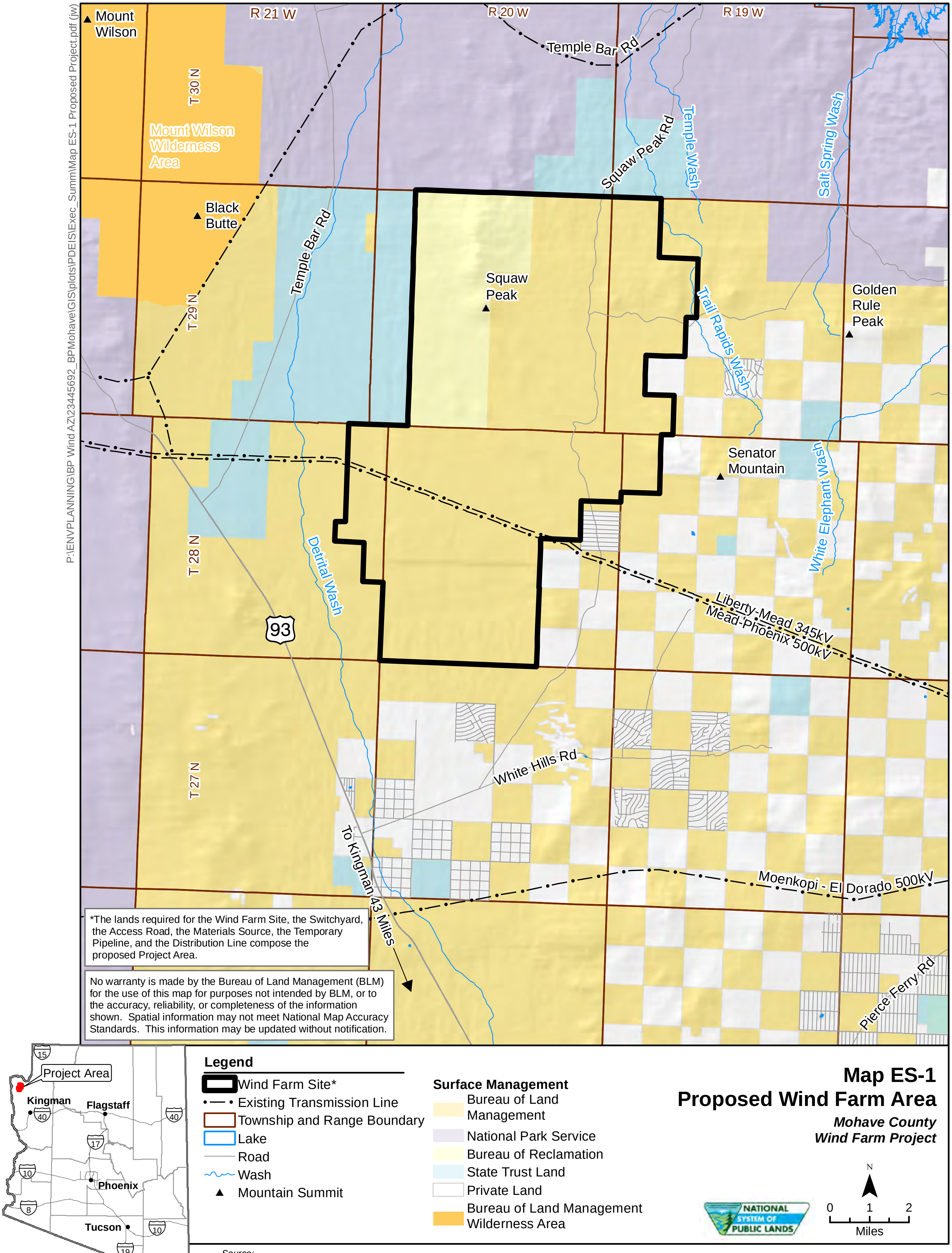
[1] A manufacturing plant where concrete is mixed and made ready to be poured before being transported to a construction site.

[2] A facility where electricity from the electrical generator is transferred to the electric grid.

P:\ENVPLANNING\BP Wind AZ\23445692_BPMohave\GIS\plots\PDEIS\Exec_Summ\Map ES-1 Proposed Project.pdf (jw)



Source:
Base Map: ALRIS 2007-2008, NHD 2008 Project Area Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

It is Reclamation’s responsibility under the Act of Congress of June 17, 1902 (32 Stat. 388); the Act of Congress approved August 4, 1939 (53 Stat. 1187), Section 10; and 43 CFR Part 429 to respond to a request for ROWs on Reclamation-administered Federal lands.

Western must consider interconnection requests to its transmission system in accordance with its Open Access Transmission Service Tariff (Tariff) and the Federal Power Act, as amended (FPA). Western satisfies FPA requirements to provide transmission service on a non-discriminatory basis through compliance with its Tariff. Under the FPA, Federal Energy Regulatory Commission (FERC) has the authority to order Western to allow an interconnection and to require Western to provide transmission service at rates it charges itself and under terms and conditions comparable to those it provides itself.

BP Wind Energy has filed applications for ROWs with BLM and Reclamation to develop the Wind Farm Site, access road, and temporary water pipeline, on public/Federal lands, respectively. BP Wind Energy has requested to interconnect its proposed Project with the Mead-Phoenix 500-kilovolt (kV) or the Liberty-Mead 345-kV transmission line through a new switchyard to be constructed by Western within the Wind Farm Site; BLM would issue a ROW to Western for the Switchyard if the Project is approved. A separate ROW application would be filed for the distribution line, which would be submitted by the owner of that line, UniSource Energy. The BLM would conduct a competitive bid or negotiated sale for the proposed materials source. Based on the analyses, three Records of Decision (RODs) may be issued, although BLM and Reclamation have elected to issue a joint ROD:

- BLM’s and Reclamation’s jointly issued ROD would approve, deny, or approve as modified separate ROWs to BP Wind Energy for development of the Wind Farm Site and any associated facilities (e.g., the access road and the temporary pipeline), and a contract for sale of mineral materials located outside the Wind Farm Site on BLM-administered public lands and Reclamation-administered Federal lands. The ROD also would address a separate ROW for the switchyard and a separate ROW to UniSource Energy for the distribution line.
- Western’s ROD would approve, deny, or approve as modified the interconnection request if the Project interconnects with one of the existing transmission lines (the Liberty-Mead 345-kV or the Mead-Phoenix 500-kV transmission line) through the Switchyard. If the 500-kV interconnection request is approved, Western would construct, operate, and maintain the Switchyard in support of the proposed Project. If the 345-kV interconnection is selected, Western would construct, own, operate, and maintain the Switchyard and Western’s ROD also would approve the replacement of the 345/230-kV transformer at Mead Substation with two new 600 megavolt-ampre (MVA) 345/230-kV transformers and associated equipment such as breakers and switches. These replacements, which would be required to accommodate the increased electrical loading related to generation from the proposed Project, would be accomplished by Western at BP Wind Energy’s expense. The existing transformer is at the terminus of the Liberty-Mead 345-kV line in Mead Substation; the substation is located near Boulder City, Nevada.

The Project’s energy generating capacity would depend on the transmission line selected. The power generation capacity would be 425 megawatts (MW) if the Project interconnects to the 345-kV Liberty-Mead transmission line and 500 MW if the Project interconnects to the 500-kV Mead-Phoenix transmission line. Power generated by the Project would enter the regional electrical grid through a proposed interconnection with one of two existing transmission lines crossing the Project Area.

Each turbine would have the capability to generate up to its nameplate capacity between 1.5 MW and 3.0 MW per turbine. Depending on the turbine model used, the turbine hubs would be between 262 feet (80 meters) and 345 feet (105 meters) above the ground, and the turbine blades would extend between 126 feet (38.5 meters) and 194 feet (59 meters) above the hub. At the top of their arc, the blades would be between 390 feet (118.5 meters) and 539 feet (164 meters) above the ground.

PURPOSE AND NEED

Overall, the purpose for federal action by the BLM, Reclamation, and Western is to respond to BP Wind Energy's Proposal to use Federal lands. In accordance with Section 1702(c) of the FLPMA, public lands administered by the BLM are to be managed for multiple-use that takes into account the long-term needs of future generations for renewable and non-renewable resources. The Secretary of the Interior is authorized to grant rights-of-way on public lands for systems of generation, transmission, and distribution of electric energy (43 U.S.C. § 501(a)(4)). Taking into account the BLM's multiple-use mandate, the purpose and need for the proposed action is to respond to a FLPMA right-of-way application submitted by BP Wind Energy to construct, operate, maintain, and decommission a wind energy facility and associated infrastructure in compliance with FLPMA, BLM right-of-way regulations, and other applicable Federal laws and policies. The proposed action responds to the projected demand for renewable energy and assists Arizona (or other western states) with meeting established renewable energy portfolio standards. This proposed action, if approved, would assist the BLM in addressing the management objectives in the Energy Policy Act of 2005 (EPAct) (Title II, Section 211), which establish a goal for the Secretary of the Interior to approve 10,000 MW of electricity from non-hydropower renewable energy projects located on public lands. This proposed action, if approved, would advance Secretarial Order 3285A1 (March 11, 2009), which establishes the development of environmentally responsible renewable energy as a priority for the Department of the Interior.

KEY PROJECT COMPONENTS AND PROJECT LIFE CYCLE

Construction of the Project would be subject to BLM's Best Management Practices (BMPs), which are designed to guide project planning, construction activities, and development of facilities to minimize environmental and operational impacts. BMPs include standards associated with overall project management, surface disturbance, facilities design, erosion control, revegetation and other mitigation, hazardous materials, project monitoring, and responsibilities for environmental inspection. The Project would develop wind energy resources in compliance with the BMPs that were evaluated in the *Final Programmatic Environmental Impact Statement for Wind Energy Development on BLM-Administered Lands in the Western United States* (BLM 2005a). Project construction and operations would incorporate the BMPs as stated in Attachment A of the *Record of Decision for the Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments* (BLM 2005b); these BMPs are included as Appendix B of this Final EIS.

A summary of the key components and land requirements for operation of the Project is provided in Table ES-1.

Table ES-1. Key Project Components, Quantities, and Land Requirements

Component	Quantity and Land Requirements for Operations	Purpose	Best Management Practices (BMPs) (if applicable)
Temporary Laydown/Staging Area	Two areas (estimated at 11 acres and 21 acres, respectively)	Secure areas for temporary construction offices, construction vehicle parking, equipment and construction materials storage, and stockpiled soil storage	Secure area placed in in relatively flat location, and sited to avoid environmentally sensitive areas. Topsoil salvaged for reuse. The Spill Prevention Control and Countermeasure (SPCC) Plan, and site-specific Stormwater Pollution Prevention Plan (SWPPP) would be followed.
Temporary Concrete Batch Plant	Two areas (within laydown/staging areas)	Facility for mixing concrete needed in construction	Plant to be located in the Temporary Laydown/ Staging area, with all BMPs applicable. Water source would be from existing wells or the well to be established for the O&M building.
Wind Turbines	Up to 283	Generate power	Each turbine site would have a plan for on-the-ground layout of turbine components before erection. The SPCC Plan would be followed.
Foundations and Pad-Mounted Transformers for the Wind Turbines	Up to 283 (foundations range from 50-60 feet wide and 8-10 feet deep)	Foundations support the turbines and transformers step up the voltage between the turbine and the electrical collection system	After the concrete has cured, the area would be backfilled leaving only the concrete pier and the transformer pad visible. The SPCC Plan would be followed.
Electrical Collection System and Communications	Approximately 100 to 120 miles of 34.5-kilovolt (kV) collector lines (located parallel to access roads: temporary disturbance area accounted for with roads)	Connect each turbine to the substation and provide for communications between the turbine and substation	As part of the perfected Plan of Development, trenching plans would be developed in cooperation with BLM and Reclamation, with input from appropriate regulatory agencies, to minimize the environmental effects that may occur with open trenches. The SPCC Plan and SWPPP would be followed. Weeds would be controlled in accordance with the Integrated Reclamation Plan. A Supervisory Control and Data Acquisition (SCADA) system would network underground fiber optic cables within the Wind Farm Site to allow for remote control monitoring of the turbines and communication between the wind turbines and the substation. The two systems would be buried in the same trenches to avoid additional need for excavation.

Component	Quantity and Land Requirements for Operations	Purpose	Best Management Practices (BMPs) (if applicable)
Electrical Distribution Substation	Two (approximately 5 acres each)	Step up the voltage of the electrical collection system for delivery through a high-voltage transmission line	Secure area placed in in relatively flat location, and sited to avoid environmentally sensitive areas. Topsoil salvaged for reuse. The SPCC Plan and SWPPP would be followed. Weeds would be controlled in accordance with the Integrated Reclamation Plan.
Overhead Transmission Line	Approximately 6 miles in length with 8 support structures per mile for 345-kV or 500-kV line	Connect with existing regional transmission line to deliver Project power to purchasing utility	Depth and diameter of holes to be determined during engineering. Vegetation removal for the corridors to use BLM approved guidelines, and be in accordance with the Plan of Development. Existing roads used when possible, but helicopters for portions of the work may be used. Design criteria would follow Avian Power Line Interaction Committee (APLIC) guidelines, to minimize the likelihood of electrocution of raptors.
Interconnection Switchyard	One (up to 10 acres)	Interface at the interconnection point between the proposed transmission line and an existing regional transmission line	Foundations would be designed for ease of removal during decommissioning. Vertical steel support structures would be erected and electrical equipment would be installed. General components would include power transformers, circuit breakers, switchgear, voltage regulators, capacitors, air switches, arresters, and various monitoring instruments/equipment. Finally, the perimeter fence and the final layer of crushed rock surfacing would be installed, possibly with an underlayment to help prevent weeds, and include spill containment where appropriate. If needed, substation and switchyard maintenance to control weeds may include physical, biological, and/or chemical control methods, as approved by the BLM, and in accordance with the Integrated Reclamation Plan.

Component	Quantity and Land Requirements for Operations	Purpose	Best Management Practices (BMPs) (if applicable)
Mead Substation Transformer Replacement (applicable with a 345-kV interconnection)	Not applicable (within existing Mead Substation)	To provide adequate equipment, the existing 345/230-kV transformer and associated equipment at Mead Substation would be replaced with two new 600 MVA 345/230-kV transformers and ancillary equipment if the Project is interconnected to the 345-kV transmission line	Western presently operates and maintains an existing switchyard at the location, and would construct, own, operate, and maintain the replacement. Work would be confined to the existing disturbed area.
Operations and Maintenance Building	One (up to 5 acres)	Employee facility for operation and maintenance of Project facilities and storage of supplies and maintenance equipment	The roof and side panels would be painted a color to blend with the environment. External lighting would be minimal with downward directed lighting. The SPCC Plan and SWPPP would be followed. Septic system would be installed in accordance with all applicable permits.
Access Roads	Approximately 3 miles of access roads linking the Wind Farm Site to US 93	Provide primary access to the Wind Farm Site from US 93	Existing roads used as much as possible. Any improvements to US 93 to be coordinated with Arizona Department of Transportation (ADOT). Road specification to be determined during final engineering design, with plans approved by BLM, Reclamation, and ADOT. Low posted speed limits for dust control.
Interior Roads	Approximately 85 to 111 miles within the Wind Farm Site	Provide internal access within the Wind Farm Site between facilities (turbines, substation, and operations and maintenance building)	Adherence to the Plan of Development Flagging Plan. Road specification to be determined during final engineering design, with plans approved by BLM and Reclamation. Low posted speed limits for dust control.
Utility and Communication Lines	Approximately 5 to 10 miles	Provide operational power and communication abilities for on-site facilities	Planning for the distribution line would be done in consultation with appropriate federal, state, and local agencies, and would include use of previously disturbed areas (where feasible and practical), avoidance of known cultural resources, consideration of temporary habitat loss, and a design that would discourage bird perching or nesting, that would be APLIC compliant.

Component	Quantity and Land Requirements for Operations	Purpose	Best Management Practices (BMPs) (if applicable)
Meteorological Towers	Up to four permanent and up to 10 additional temporary met towers (9 square feet for each tower)	Monitor wind speed	The area disturbed by installation of meteorological towers (i.e., footprint) will be kept to a minimum. No fencing, utilities, welding, or road building would be required. Structural design would discourage bird perching, and would be APLIC compliant.

Following is the summary of the pre-construction and site preparation activities; construction schedule and activities; an overview of operations and maintenance; and decommissioning process.

Pre-Construction and Site Preparation

During final design, detailed plans would be developed or refined to further guide site preparation, construction, and post-construction. This may include, but is not limited to, an Integrated Reclamation Plan, Transportation and Traffic plan (which would address the transport of equipment); Health, Safety, Security and Environment (HSSE) Plan (including emergency response and waste management); and Historic Properties Treatment Plan. During final design, these plans, along with the Site Grading Plan (which would incorporate the Flagging Plan and construction drawings), and an updated Plan of Development would be reviewed with appropriate agencies with jurisdictional or technical expertise or regulatory responsibilities, including but not limited to BLM, Reclamation, Western, and Mohave County.

All pre-construction activities would use BMPs to minimize potential impacts to the environment. Pre-construction activities would include:

- A site survey to stake out the exact location of the wind turbines, access roads, electrical lines, substation areas, and other major Project features. Locations of sensitive resources would be flagged or clearly marked for avoidance. Limits of proposed disturbance areas would be flagged per the Flagging Plan.
- A site walk-over inspection by environmental and agency inspectors, the contractor, and any subcontractors to identify and mark sensitive resources to avoid, limits of clearing, location of drainage features, and the layout for sedimentation and erosion control measures. This walk- over would occur on a regular basis, both pre-construction and during construction.
- An orientation and training for supervisors and work crews to explain safety rules, environmental awareness and compliance programs, and minimization of construction waste.

Site preparation activities would include clearing, grading, and blasting. Proposed activities include:

- Establishing sediment and erosion controls in accordance with the Stormwater Pollution Prevention Plan (SWPPP) as well as BMPs.
- Removing topsoil[3] bearing organic components would be used in reclamation that takes place during construction or stockpiled for use in site reclamation.
- Potential blasting to achieve the necessary slope and gradient for access roads or for foundation construction, which would be conducted in accordance with a Blasting Plan prepared in advance of construction and approved by BLM and Reclamation.

Construction

Construction is anticipated to begin after permitting is complete and purchasers of the Project’s power are identified; construction would take approximately 12 to 18 months (52 to 78 weeks). Table ES-2 outlines the construction activities and their anticipated duration.

[3] Surface soil usually including the organic layer in which plants have most of their roots.

Table ES-2. Proposed Construction Schedule (Approximate)

Facility	Start	Duration
Road Construction	Week 3	25 weeks
Substation Construction	Week 4	32 weeks
Transmission Line Installation	Week 6	20 weeks
Foundation Construction	Week 7	28 weeks
O&M Building Construction	Week 8	16 weeks
Collector Line Installation	Week 9	22 weeks
Turbine Generator Installation	Week 11	35 weeks
Turbine Commissioning	Week 15	35 weeks
Site Restoration (Interim Reclamation)	Week 50	8 weeks

The number of construction personnel on site is expected to range from 300 to 500 (during peak construction). The expected total round trip count of 55,930 to 80,930 vehicles over a 12- to 18-month period results in an average trip count of 215 to 311 trips into and out of the Project Area per workday. Personal vehicles would be parked at the main staging area for the site. From this point, only delivery and on-site construction vehicles would use construction access roads.

Construction of the Project is anticipated to commence after a Notice to Proceed and a right to use authorization is issued by BLM, Reclamation, and Western and other necessary commercial agreements are issued. Ideally, the wind farm would be developed in a single construction interval. However, depending on the market for the power and the negotiated power purchase agreement, the proposed Project could potentially be developed in two or more construction intervals. Should more than one construction interval be necessary, plans would be coordinated with BLM and/or Reclamation to address treatment of temporary facilities and the reclamation schedule. Once completed, the wind energy facility is planned to operate for up to 30 years.

The components of the Project would include wind turbines; foundations and pad-mounted transformers; electrical collection, communication, and distribution systems; access roads; and ancillary facilities including an O&M building and permanent met towers. The exact location of the wind turbines, roads, and transmission interconnect lines would be determined during final design following completion of wind resource data analyses and other environmental studies, including identification of construction constraints and sensitive cultural or natural resources to be avoided. However, proposed locations have been identified with buffers large enough to account for the anticipated minor adjustments in the placement of Project components during final design. Throughout all facets of the Project, BMPs would be required and would be applied both to the management of the Project and as environmental mitigation.

Clearing and disposing of trash, debris, and shrub/scrub on those portions of the site where construction would occur would be performed at the end of each work day through all stages of construction unless held for later use in reclamation. Disposal of non-hazardous cuttings and debris would be in an approved facility designed to handle such waste or at the direction of the BLM/Reclamation-authorized officer, which may include using vegetative cuttings as mulch in the Project Area during reclamation.

Operations and Maintenance

The functionality of the wind turbines and safety systems would be tested to ensure they operate in accordance with the manufacturer's specification before the turbines are commissioned for operation. Energizing the Project would start at the point of interconnection and eventually be energized all the way to the turbines. In general the order of energizing the system would be:

- The switchyard (the point of interconnection)
- The transmission line
- The substation
- The collection system
- The pad mounted transformers at each turbine
- The turbines

At each stage, testing would be performed to ensure the equipment has been installed correctly. When all systems have been tested and are operating properly, the Project would be commissioned for commercial operation and sale of energy.

Wind farm facilities are comprised of many individual wind turbine generators, and O&M activities would not affect the entire wind farm's operation. Annual maintenance would be conducted on a turbine-by-turbine basis and would not affect performance of the wind farm. Routine wind turbine maintenance and service would occur every six months commencing after the first six months that the Project is in service, and would be performed by a staff of approximately 30 employees. Maintenance and service would include the following activities:

- Hydraulic pressure checks
- Accumulators' nitrogen recharge
- Oil level checks on all operating parts
- Visual checks for leaks
- Grease all bearings on moving parts
- Check all bolt torques
- General clean-up within the wind turbine
- Perform any additional modifications/replacements needed

During the Project operations period, roads would be specifically inspected for erosion, blockage of culverts, and damaged cattle guards twice annually. During Project operations, public access to the Project Area would be monitored at certain access points to provide for the safety of the public in and around the operating equipment; however long-term dispersed recreational use throughout the Project Area would continue to be allowed. Public access in the Project Area may be temporarily restricted during maintenance activities on roads or facilities, when warranted for public safety reasons. Access also may be restricted (i.e., closed to public vehicle travel), upon approval by BLM, in areas where reclamation efforts have been undertaken and public access into those areas would diminish the reclamation efforts. The transmission line ROW would be cleared, as needed, to ensure that vegetation does not come within the safe operating distance of the transmission line. Substation and switchyard maintenance may include treating crushed rock surfaces with herbicides to control weeds, if approved by the BLM and/or Reclamation. In general, unless there are unplanned events such as repair of turbine components due to manufacturer defects, maintenance would only consist of routine services that would require only normal access to the Project Area.

Decommissioning

The Project is anticipated to have a lifetime of up to 30 years, after which it may no longer be cost effective to continue operations. The Project would be decommissioned, and the existing equipment removed. At that time, an updated decommissioning plan would be provided to BLM and Reclamation for review and approval.

The goal of Project decommissioning is to remove the installed power generation equipment and return the site to a condition as close to a pre-construction state as feasible. The major activities required for the decommissioning are as follows:

- Remove wind turbines and met towers – the disassembly approach would limit the need for new clearance of areas.
- Remove aboveground substations, transmission line, and aboveground collector lines.
- Remove structural foundations in accordance with BLM- and/or Reclamation-approved decommissioning plan.
- Remove roads not desired for other purposes – if BLM or Reclamation choose to retain the roads, maintenance would become the responsibility of the agency.
- Remove the O&M building.
- Re-grade and recontour the disturbed areas.
- Revegetate disturbed areas.

PROJECT FEATURE OPTIONS

Within the Project, there are several options related to specific Project features. Any of the options identified could be selected and still satisfy the purpose and need. Table ES-3 summarizes the Project feature options.

Table ES-3. Project Feature Options

Project Feature	Option 1	Option 2
Turbine Color	White	Light gray (such as RAL 7035 or equivalent)
Transmission Line Interconnection	345-kV Liberty-Mead on site	500-kV Mead-Phoenix on site
Collector Lines	All below ground	Partly below ground, partly aboveground

Alternative A – Proposed Action

Alternative A is the proposed action identified by BP Wind Energy. The Wind Farm Site would encompass approximately 38,099 acres of public land managed by the BLM and approximately 8,960 acres of land managed by Reclamation. The number of turbines constructed would vary depending on the turbine type that is installed, but Alternative A could accommodate a greater maximum number of turbines than the other alternatives. Alternative A could support development of approximately 203-283 turbines depending on turbine size chosen (Table ES-4). The specific turbine count and layout would be determined through micro-siting, which may include analysis of the physical constraints of the landscape; the strength of the wind resource; geotechnical testing results; and avoidance of waters of the U.S. and cultural resources, among other factors. Micro-siting would occur as part of perfecting the Plan of Development. Flexibility to place turbines within the corridors would be necessary in order to address specific engineering and environmental constraints identified through this EIS and during BLM's and Reclamation's review of construction plans prior to issuance of notices to proceed with construction.

While the various Project feature options of transmission line interconnection and collector lines could be considered with Alternative A, BP Wind Energy proposes to install industry-standard non-reflective white or light off-white turbines. Future studies would determine the best solution for the collector lines, but a combination of underground and aboveground collector lines is expected. The preferred option for an interconnection cannot be firmly identified until more progress is made in determining which utility is interested in purchasing the power generated by the plant. In addition, the 500-kV Mead-Phoenix line has the potential to be converted to direct current upon approval by the owners (or "participants") involved with that line (of which Western is one). Converting the line to direct current could entail negative operational and financial impacts on the Project proponent and other power generators interconnected to this line.

Table ES-4. Range of Turbine Types, Turbine Counts, and Power Production by Alternative

Alternatives (acreage)	Turbine Rotor Diameter (meters)	Per Turbine Electrical Output (MW)	Number of Turbine Positions [1]	Power Production (MW) [2]
Alternative A				
38,099 on BLM; 8,960 on Reclamation	77 to 82.5	1.5	283	425
	90 to 101	1.6 to 2.0	255	408 to 500
	112 to 118	2.3 to 3.0	203	467 to 500
Alternative B				
30,872 on BLM; 3,848 on Reclamation	77 to 82.5	1.5	208	312 [4]
	90 to 101	1.6 to 3.0	194	310 [4] to 500
	112 to 118	2.3 to 3.0	153	352 [4] to 459 [3]
Alternative C				
30,178 on BLM; 5,124 on Reclamation	77 to 82.5	1.5	208	312 [4]
	90 to 101	1.6 to 3.0	194	310 [4] to 500
	112 to 118	2.3 to 3.0	154	354 [4] to 462 [3]
Alternative E				
35,329 on BLM; 2,781 on Reclamation	77 to 82.5	1.5	243	364 [4]
	90 to 101	1.6 to 3.0	228	364 [4] to 500
	112 to 118	2.3 to 3.0	179	411 to 500

NOTES:

[1] Number of turbines positions is approximate and subject to minor changes as the Project moves through detailed design and into construction.

[2] Greater than 500 MWs total Project generating capacity is physically possible for some turbine models, but the Project would not exceed 500 MW as that is the maximum output sought per the Project's transmission interconnection applications.

[3] If the Project interconnects to the 500-kV Mead-Phoenix transmission line, a 500 MW nameplate capacity would be achieved by using a combination of turbine types with certain corridors using a turbine model with high MW capacity but a smaller rotor diameter that can be spaced more closely together. Therefore, the maximum number of turbines would be within the range of 153-194 turbines.

[4] The power production range falls below the applicant's need to meet an interconnection requirement of 425 MW to 500 MW if turbines of lower nameplate MW were selected.

Alternative B

In response to concerns raised by the National Park Service and residential developers, BLM developed Alternative B, which reduces the Wind Farm Site footprint and likely would have fewer turbines than Alternative A. The intent would be to reduce visual and noise impacts primarily on Lake Mead National

Recreation Area (NRA) and secondly on private property. The Wind Farm Site would encompass approximately 30,872 acres of public land managed by the BLM and approximately 3,848 acres of land managed by Reclamation. The number of turbines constructed would vary depending on the turbine type that is installed, but Alternative B could support development of a 153-208 turbines.

With a smaller footprint than Alternative A, Alternative B presents greater challenges associated with achieving the nameplate capacity per the interconnection agreements. While it is preferable to have a single turbine type (size and manufacturer) throughout the wind farm for uniformity of equipment, parts, and maintenance processes during operations, one option (to achieve nameplate capacity if a smaller turbine is used) would be to have one or more turbine corridors filled by a larger generation capacity turbine than in the balance of the wind farm. Alternatively, the turbines in certain corridors could be squeezed more closely together as long as they retain the manufacturer's spacing requirements. While tighter spacing may reduce the generation efficiency of an individual turbine, the added turbines may collectively help to achieve the nameplate capacity rating. However, 208 turbines would remain the maximum number of turbines installed with Alternative B. The Project would still be required to meet the 425 MW or 500 MW interconnection requirements.

Other Project features would be comparable to those identified with Alternative A. All Project feature options (turbine color, transmission line, and collector lines) would be considered as suitable options for Alternative B.

Alternative C

Alternative C also reduces the Wind Farm Site footprint and likely would have fewer turbines than Alternative A with the intent of reducing visual and noise impacts primarily on private property and secondly on Lake Mead NRA. The Wind Farm Site would encompass approximately 30,178 acres of public land managed by the BLM and approximately 5,124 acres of land managed by Reclamation. Distances between turbines and private property would be greater with Alternative C than with the other action alternatives. The number of turbines constructed would vary depending on the turbine type that is installed, but Alternative C could support development of 154-208 turbines, and no more than 208 turbines would be installed with this alternative.

Like Alternative B, methods to achieve the nameplate capacity with Alternative C could include use of more than one turbine type and alteration of the turbine spacing to generate the 425 or 500 MW of power needed to satisfy the interconnection request, while staying within the turbine corridors identified in the reduced land area. The Project would still be required to meet the 425 MW or 500 MW interconnection requirements.

Other Project features would be comparable to those identified with Alternative A. All Project features options (turbine color, transmission line, and collector lines) would be considered as suitable options for Alternative C.

Alternative D – No Action

Alternative D is the no-action Alternative in which the Project would not be built and provides a baseline against which action alternatives can be compared. Alternative D assumes that no actions associated with the Project would occur, and no ROWs or interconnections would be granted. The BLM-administered public lands would continue to be managed in accordance with the Kingman Resource Management Plan and the Reclamation-administered lands would continue to be managed by Reclamation. The need would not be met for the agencies to respond to BP Wind Energy's application to develop the wind farm and to interconnect with Western's transmission system, through the established application processes of both agencies. Capacity on Western's transmission lines would remain available for other projects.

The No Action Alternative would not support the BLM's management objective to increase renewable energy production on public lands per the Energy Policy Act (EPAct); support BLM's Wind Energy Development Policy for increasing renewable energy production on BLM-administered public lands; or respond to the projected demand for energy described in the EPAct. However, taking no action on the Project would not preclude the opportunity for other renewable energy projects to be considered.

Alternative E – Agencies' Preferred Alternative

The Agencies' Preferred Alternative was selected based on the analysis in this EIS, consideration of public comments, and the golden eagle survey data that emerged during the 2012 biological surveys. These data indicated a need to establish a no-build area and curtailment zone to reduce potential impacts on golden eagles within the Squaw Peak breeding area in the northwest portion of the Wind Farm Site. As a result, Alternative E was established with the rationale focused on (1) coordination and consultation among the U.S. Fish and Wildlife Service (USFWS), BLM, Reclamation, and Arizona Game and Fish Department (AGFD) regarding concerns for golden eagle breeding areas, (2) concerns for visual and noise impacts on Lake Mead NRA, and (3) concerns for visual and noise impacts on existing residences.

Alternative E, the Agencies' Preferred Alternative, is a combination of Alternatives A and B. Similar to Alternative B, several of the turbine corridors in the northwest corner of the Alternative A Wind Farm Site and certain corridors in the northeastern portion of the site where the turbines would be along ridgelines would be excluded from the Project Area. Consistent with Alternative A and B, Alternative E would provide for a minimum of ¼ mile between private property boundaries and the nearest turbine. Like Alternative A, the southernmost turbine corridor in the Wind Farm Site would be available, but only if needed to meet the generation capacity requirements identified in the interconnection agreement with Western. The Alternative E Wind Farm Site would consist of up to approximately 35,329 acres of BLM-administered land and approximately 2,781 acres of Reclamation-administered land (see Maps 2-11 to 2-13 in Chapter 2). As described in Section 2.6.6, certain turbine corridors would be available for use only if required to meet the nameplate capacity identified in interconnection agreements with Western, so the total amount of land needed could be somewhat less. If the turbine corridors are not needed to meet the generation requirements, Alternative E would further mitigate the potential for impacts to golden eagles, reduce the visual and noise effects on Lake Mead NRA, and reduce the visual and noise effects on private property and residences south of the Project Area.

The number of turbines constructed with Alternative E would vary depending on the turbine type that is installed and the full range of micro-siting constraints. Alternative E could support development of 179 turbines, and no more than 243 turbines would be installed with this alternative. With Alternative E, the turbines would be a light gray color to reduce visual contrast.

Alternative E would not result in effects that are outside the range of alternatives analyzed in the EIS because the proposed turbine corridors are already part of the alternatives analyzed in the EIS. Therefore, the impacts associated with the construction, operation, maintenance, and decommissioning of wind turbines within those corridors are fully disclosed and analyzed in the EIS. The identification of a preferred alternative does not constitute a commitment or decision in principle, and there is no requirement to select the preferred alternative in the ROD.

Project Design Refinements and Bonding

Surface disturbance locations and acreages identified in this EIS are based on a preliminary level of engineering and represent a reasonable maximum disturbance amount anticipated for the Project. The estimated areas of disturbance are conservative and are listed as the estimated maximum amount, thus generally covering more acres than would be required for the proposed facilities. This serves to disclose a greater degree of environmental impact than is likely to occur. However, due to possible Project refinement during construction, Project features and alignments may change slightly to enhance safety, minimize environmental disturbance, and better accommodate on-the-ground conditions. Consistent with the terms and conditions of a Right of Way grant if issued by BLM, Reclamation, or Western, a variance process, defined in the Compliance and Monitoring Plan, would be used to approve minor project refinements.

BP Wind Energy would post a BLM-required bond or other form of mutually acceptable security for the Project to ensure compliance with the terms and conditions of the ROW authorization and the requirements of applicable regulations. The amount of the security bond would be based on the number of turbines and site-specific and Project-specific factors.

ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Impacts are defined as modifications to the environment over existing conditions (the No Action Alternative) that are caused by a proposed action. Potential impacts considered include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems) aesthetic, historical, cultural, economic, social, and health impacts.

Impacts were analyzed by resource area based on information provided by BP Wind Energy in the initial application and in response to subsequent data requests; field investigations and surveys; public scoping; literature research; and input from federal, state, and local agencies. The environmental effects of constructing, operating, maintaining, and decommissioning the Project as proposed in the action alternatives are presented in Table ES-5. Impact analysis and methodology are described in detail in each resource section in Chapter 4 of this Final EIS. The mitigation measures identified in Table ES-5 refer to the Project-specific mitigation measures described in Chapter 4. The BMPs that are described in Chapter 2 as applicant committed measures and the BMPs from the *Final Programmatic EIS on Wind Energy Development of BLM Administered Lands in the Western States*, as described in Appendix B of this Final EIS, are not repeated in Table ES-5. Unless noted, mitigation measures for Alternatives B, C, and E (the Agencies' Preferred Alternative) would be the same as those listed for Alternative A.

Table ES-5. Comparison of Resource-Specific Impacts

<table>
<tr><th rowspan="2">Resource</th><th colspan="5">Possible Impacts</th></tr>
<tr><th>Alternative A</th><th>Alternative B</th><th>Alternative C</th><th>Alternative D – No Action</th><th>Alternative E – Agencies' Preferred Alternative</th></tr>
<tr><td rowspan="3">Climate and Air Quality</td><td>Construction: The construction period would be 12 to 18 months with a total area of temporary ground disturbance of 1,537 acres.
Average site-wide total pollutant emissions during construction:
• volatile organic compounds (VOCs): 37.80 tons.
• carbon monoxide (CO): 262.9 tons.
• nitrogen oxides (NOx): 206.2 tons.
• particulate matter (PM_{10}): 958.4 tons.
• sulfur dioxide (SO_2): 23.8 tons.
• Releases of these pollutants and greenhouse gas (GHG) emissions would be temporary (through the construction period) and would not exceed allowed limits.
Mitigation:
• Reduce earthmoving activity if winds exceed 22 miles per hour or gusts exceed 30 miles per hour.
• Apply water or BLM-approved palliatives to the ground surface.
• Enforce an on-site 25 mile per hour speed limit.
• Place cobble beds at egress points.
• Use trained personnel to observe opacity conditions.
• Comply with the Transportation and Traffic Plan (summarized in Appendix C.2.8 in this Final EIS).
• Comply with the Dust and Emissions Control Plan (summarized in Appendix C.2.6 in this Final EIS).</td><td>Construction:
• Temporary ground disturbance would be approximately 303 fewer acres than Alternative A. Reducing ground disturbing activities decreases the air pollutant emissions during construction.</td><td>Construction:
• Temporary ground disturbance would be approximately 273 fewer acres than Alternative A and would reduce air emissions.</td><td>Emissions related to construction, operations and maintenance, and decommissioning would not occur.

As noted in the analysis, there could be a potential increase in GHG emissions and criteria pollutant emissions (PM, CO, NOx, PM, SO_2, Lead, and Ozone) from producing energy using non-renewable energy sources, which is a potential consequence of not developing renewable energy projects.</td><td>Construction:
• Air pollutant emissions attributable to construction for Alternative E would be lower than the construction air emissions predicted for Alternative A and higher than those predicted for Alternatives B and C. Phasing construction of turbines as the nameplate capacity is achieved could potentially decrease air pollutant emissions for the Project relative to the Alternatives A, B and C.</td></tr>
<tr><td>Operations and Maintenance:
• Small amounts of PM, NOx, VOCs CO, SO_2 and GHG emissions and small quantities of VOCs during routine maintenance.
Mitigation:
• Enforce an on-site 25 mile per hour speed limit.</td><td>Operations and Maintenance:
• Same as Alternative A.</td><td>Operations and Maintenance:
• Same as Alternative A.</td><td>Operations and Maintenance:
No impacts.</td><td>Operations and Maintenance:
• Same as Alternative A.</td></tr>
<tr><td>Decommissioning:
• Similar to Construction, and temporary in nature.
Mitigation:
• Same as Construction.</td><td>Decommissioning:
• Similar to Construction emissions for this alternative; however, as there would be fewer turbines to decommission, air pollutant emissions could be less compared to Alternative A due to the decrease in ground disturbing activities.</td><td>Decommissioning:
• Similar to Alternative B.</td><td>Decommissioning:
No impacts.</td><td>Decommissioning:
• Similar to Alternative B, although decommissioning would affect up to 83 acres more than Alternative B.</td></tr>
<tr><td>Geology, Soils, and Minerals</td><td>Construction (including Pre-construction):
Geology:
• Surface and subsurface disturbance during construction activities could affect geologic resources including bedrock. However, the extent of bedrock disturbance depends upon the construction item and the location of the individual item.
• Temporary impacts to approximately 1,537 acres. Long-term impacts to approximately 317 acres.</td><td>Construction:
Geology:
• Similar to Alternative A except there would be a reduction in impacts on geologic resources and bedrock due to fewer acres of temporary and long-term disturbance. Temporary ground disturbance would be approximately 303 fewer acres and long-term disturbance would be 56 fewer acres than Alternative A.</td><td>Construction:
Geology:
• Similar to Alternative A except temporary ground disturbance would be approximately 273 fewer acres and long-term disturbance would be 48 fewer acres than Alternative A.</td><td>Construction:
Geology:
No impacts</td><td>Construction:
Geology:
• Similar to Alternative A except temporary ground disturbance would be approximately 220 fewer acres and long-term disturbance would be 49 fewer acres than Alternative A.</td></tr>
</table>

Resource	Possible Impacts: Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Soil: • Ground disturbing activities could result in 1,537 acres of temporary removal or disturbance of surface soils and 317 acres of long-term disturbance. • Long-term impacts would be the localized removal of soils for turbine foundations and other project feature foundations. **Minerals**: • Subject to a sales contract with the BLM, the Detrital Wash Materials Pit would be used to supply approximately 180,000 to 210,000 cubic yards of aggregate material for the Project. **Mitigation**: • Areas of temporary disturbance would be reclaimed to as near as possible to pre-disturbance conditions in accordance with the Integrated Reclamation Plan. • Soil erosion minimized through implementation of the Dust Control Plans and Stormwater Pollution Prevention Plan (SWPPP). • Apply water or BLM-approved palliatives to the ground surface. • Enforce an on-site 25 mile per hour speed limit. • Recontour disturbed areas to pre-disturbance conditions to the extent possible. •	**Soil**: • Similar to Alternative A except there would be a reduction in impacts on soil resources due to fewer acres of temporary and long-term disturbance. Temporary ground disturbance would be approximately 303 fewer acres and long-term disturbance would be 56 fewer acres than Alternative A. **Minerals**: • Same as Alternative A.	**Soil**: • Similar to Alternative A except temporary ground disturbance would be approximately 273 fewer acres and long-term disturbance would be 48 fewer acres than Alternative A. **Minerals**: • Same as Alternative A.	**Soil**: No impacts **Minerals:**: No impacts	**Soil**: • Similar to Alternative A except temporary ground disturbance would be approximately 220 fewer acres and long-term disturbance would be 49 fewer acres than Alternative A. **Minerals**: • Same as Alternative A.
	Operations and Maintenance: **Geology**: • Minimal to No impacts. **Soil:** • Minimal impact related to maintenance of roads and erosion control activities. **Minerals:** • The ability to mine future discoveries would be limited during operations unless BLM or Reclamation would allow mining between turbine corridors during operations. Historically, however, mining interest in this area has been minimal. **Mitigation:** • Comply with the Dust and Emissions Control Plan. • Apply water or BLM-approved palliatives to the ground surface. • Enforce an on-site 25 mile per hour speed limit. • To the extent practicable, roads, turbines, and other structures would be located away from unstable areas. • Reclamation activities for the Materials Source would be conducted under its approved Mine Plan of Operations.	**Operations and Maintenance:** **Geology**: • Similar to Alternative A. **Soil**: • Similar to Alternative A. **Minerals**: • Similar to Alternative A.	**Operations and Maintenance:** **Geology**: • Similar to Alternative A. **Soil**: • Similar to Alternative A. **Minerals**: • Similar to Alternative A.	**Operations and Maintenance:** **Geology**: No impacts.	**Operations and Maintenance:** **Geology**: • Similar to Alternative A. **Soil**: • Similar to Alternative A. **Minerals**: • Similar to Alternative A.
	Decommissioning: **Geology:** • Disturbed areas would be recontoured and reclaimed and rock slope would be cut back to a stable grade.	**Decommissioning:** **Geology**: • Similar to Alternative A.	**Decommissioning:** **Geology**: • Similar to Alternative A.	**Decommissioning:** **Geology**: No impacts.	**Decommissioning:** **Geology**: • Similar to Alternative A.

Resource	Possible Impacts: Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Soil: • Temporary increased risk of stormwater-related erosion and blowing dust. • Top 36 inches of the turbine foundation would be removed; foundations would be constructed of non-leaching materials so no long-term effect on geological and soil characteristics removed. **Minerals:** • Mineral resources expected to be unchanged. **Mitigation:** • Same as Construction.	**Soil:** • Similar to Alternative A. **Minerals**: • Similar to Alternative A.	**Soil:** • Similar to Alternative A. **Minerals**: • Similar to Alternative A.	**Soil:** No impacts. **Minerals**: No impacts.	**Soil:** • Similar to Alternative A. **Minerals**: • Similar to Alternative A.
Water Resources	**Construction:** **Surface Water:** • Construction activities that disturb the surface, such as clearing, grading, trenching, and excavation to build turbine foundations, could increase the potential for sediment erosion and transport by removing stabilizing vegetation and increasing runoff during storm events. • Ground disturbing activities could result in the removal and disturbance of surface soils from 1,537 acres of temporary disturbance and 317 acres of long-term disturbance, increasing the potential for sediment erosion and transport in disturbed areas, until successfully reclaimed. • Up to 17.26 acres of jurisdictional water impacted (the total may be lower in final design through avoidance). BP Wind Energy, in consultation with U.S. Army Corps of Engineers, would obtain a Permit under the Section 404 Clean Water Act. •	**Construction:** **Surface Water:** • Similar to Alternative A except fewer acres of temporary and long-term ground disturbance would lessen delivery of sediment to ephemeral washes associated with stormwater than Alternative A. Temporary ground disturbance would be approximately 303 fewer acres and long-term disturbance would be 56 fewer acres than Alternative A. • Up to 15.5 acres of jurisdictional water impacted, other impacts similar to Alternative A.	**Construction:** **Surface Water:** • Similar to Alternative A except temporary ground disturbance would be approximately 273 fewer acres and long-term disturbance would be 48 fewer acres than Alternative A. • Up to 15.75 acres of jurisdictional water impacted; other impacts similar to Alternative A.	**Construction:** **Surface Water** The primary actions and features that currently affect water quality and hydrology would remain the same. Existing hydrologic processes, including erosion and sedimentation, would continue to occur.	**Construction:** **Surface Water:** • Similar to Alternative A except temporary ground disturbance would be approximately 220 fewer acres and long-term disturbance would be 49 fewer acres than Alternative A. • Up to 16.10 acres of jurisdictional water impacted, other impacts similar to Alternative A.
	Groundwater: • Average daily water use at the batch plant of 28,000 to 40,000 gallons for the 25-week construction period (maximum 5.0 million gallons total). • 100,000 gallons per day (five days a week, for 39 weeks) for dust control (19.5 million gallons total). • Combined total (batch plan and dust control): 75.2 acre-feet, which represents 0.03 percent of recoverable groundwater. • Potential impact from spills and leaks from motorized equipment, but impacts unlikely given the depth to groundwater (160 feet). **Mitigation:** • Prevent water degradation by implementing a SPCC Plan and a site-specific SWPPP; complying with all necessary permits (Federal, state, and local), and complying with erosion control actions, as described in the Integrated Reclamation Plan.	**Groundwater:** • Impacts would be similar to Alternative A, but with proportionally less effects if there are fewer turbines constructed.	**Groundwater:** • Impacts would be similar to Alternative A, but with proportionally less effects if there are fewer turbines constructed.	**Groundwater:** No impacts.	**Groundwater:** • Impacts would be similar to Alternative A, but with proportionally less effects if there are fewer turbines constructed.
	Operations and Maintenance: **Surface Water:** • Temporary increase in erosion during road maintenance, contributing to sediment in local surface water.	**Operations and Maintenance:** **Surface Water:** • Similar to Alternative A except there would be a reduction in potential for sediments in local surface water due to fewer acres of temporary and long-term ground disturbance. Long-term disturbance would be 56 fewer acres than Alternative A.	**Operations and Maintenance:** **Surface Water:** • Similar to Alternative A except long-term disturbance would be 48 fewer acres than Alternative A.	**Operations and Maintenance:** **Surface Water:** No impacts	**Operations and Maintenance:** **Surface Water:** • Similar to Alternative A except long-term disturbance would be 49 fewer acres than Alternative A.

Resource	Possible Impacts Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Groundwater: • A well, comparable to residential use, would be installed near the O&M building and pumped at an estimated 100 gallons per day (0.1 acre-feet per year). **Mitigation:** • Implement an SPCC Plan. • Implement a site-specific SWPPP. • Inspect roads monthly and after heavy rainfall for road/culvert degradation. • Comply with all necessary permits (Federal, state, and local). • Comply with erosion control actions as described in the Integrated Reclamation Plan.	**Groundwater:** • Same as Alternative A.	**Groundwater:** • Same as Alternative A.	**Groundwater:** No impacts.	**Groundwater:** • Same as Alternative A.
	Decommissioning: **Surface Water:** • Increase in potential for sediment erosion and transport in disturbed areas, until successfully reclaimed. **Groundwater:** • Similar to the amount of water used during construction for dust suppression. • An appropriate source of water for dust suppression would be identified in coordination with BLM and Reclamation during planning for the decommissioning process because available sources may change by the time the Project is decommissioned. **Mitigation:** • Same as Construction.	**Decommissioning:** **Surface Water:** • Similar to Alternative A except there would be a reduction in potential for sediment erosion and transport due to fewer acres of temporary disturbance **Groundwater:** • Overall, impacts would be similar to Alternative A, but with proportionally lesser effects because the Project footprint and amount of surface disturbance would be smaller.	**Decommissioning:`** **Surface Water:** • Similar to Alternative B. **Groundwater:** • Same as Alternative B.	**Decommissioning:** **Surface Water:** No impacts. **Groundwater:** No impacts.	**Decommissioning:`** **Surface Water:** • Similar to Alternative B. **Groundwater:** • Same as Alternative B.

Resource	Possible Impacts				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D – No Action**	**Alternative E – Agencies' Preferred Alternative**
Biological Resources	**Construction:** **Vegetation and Land Cover Types:** • Total short-term impact to vegetation includes about 1,537 acres where plants (primarily Sonoran-Mojave Creosotebush-White Bursage Desert Scrub cover type) would be cleared for construction. **Mitigation:** • Mow or crush vegetation in areas of temporary disturbance, where practical. • Limit vehicle and foot traffic. • Implement an ecological awareness program. • Develop an Integrated Reclamation Plan with a habitat restoration plan.	**Construction:** **Vegetation and Land Cover Types:** Overall, impacts would be similar to Alternative A, but with proportionally lesser effects because the Project footprint and amount of surface disturbance would be smaller. Specific differences from Alternative A include: • Total short-term impact to vegetation would include about 1,234 acres where plants (primarily Sonoran-Mojave Creosotebush-White Bursage Desert Scrub cover type) would be cleared for construction.	**Construction:** **Vegetation and Land Cover Types:** Overall, impacts would be the similar to Alternative A, but with proportionally lesser effects because the Project footprint and amount of surface disturbance would be smaller. Specific differences would include: • Total short-term impact to vegetation would include about 1,264 acres where plants (primarily Sonoran-Mojave Creosotebush-White Bursage Desert Scrub cover type) would be cleared for construction.	**Construction:** **Vegetation and Land Cover Types:** No impacts.	**Construction:** **Vegetation and Land Cover Types:** Overall, impacts would be similar to Alternative A, but with proportionally lesser effects because the Project footprint and amount of surface disturbance would be smaller. Specific differences from Alternative A include: • Total short-term impact to vegetation would include about 1,317 acres where plants (primarily Sonoran-Mojave Creosotebush-White Bursage Desert Scrub cover type) would be cleared for construction.
	Noxious Weeds: • Disturbed ground from clearing activities would be prone to infestation by noxious weeds and invasive plant species. • Potential for trucks delivering materials to carry noxious or invasive weed seeds and other plant parts that could introduce noxious weeds or invasive plant species. **Mitigation:** • Mow or crush vegetation (rather than removing it) in areas of temporary disturbance. • Limit vehicle and foot traffic. • Implement an ecological awareness program. • Survey for noxious weeds and invasive species, and treat according to Integrated Reclamation Plan requirements. • Pre-treat reclamation sites to limit germination. • Clean and inspect vehicles to prevent propagating reproductive materials of invasive plants and noxious weeds from entering the Project Area. • Use fill materials from on-site sources to the extent possible. Use weed-free sources of outside fill material. • Use certified weed free mulch material and seeds for reclamation. • Use an integrated approach to manage infestations.	**Construction:** **Noxious Weeds** Impacts from noxious weeds and invasive plant species would be reduced slightly compared to Alternative A, with about 303 fewer acres subject to temporary ground disturbance than Alternative A. With fewer acres disturbed, the potential for establishment of noxious weeds would decrease under Alternative B in comparison to Alternative A.	**Construction:** **Noxious Weeds** Impacts are reduced slightly compared to Alternative A, but would differ little from Alternative B. The short-term disturbance area would be about 1,264 acres, which is approximately 273 fewer acres than Alternative A and 30 acres more than Alternative B.	**Construction:** **Noxious Weeds** No impacts.	**Construction:** **Noxious Weeds** Similar impacts as Alternatives A, B, and C except the short-term disturbance area would be approximately 1,317 acres which could reduce impacts from noxious weeds and invasive plant species compared to A.

Resource	Possible Impacts Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Wildland Fire: • Traffic and human activity would provide the potential for human sourced ignitions. • Potential infestation from invasive plant species and noxious weeds would provide for wildland fire to affect areas outside the disturbance footprint. **Mitigation:** • Remove vegetative fuel and manage weeds to help retain the current Class 2 condition. • Limit traffic to only essential vehicles in the construction areas. • Establish parking guidelines. • Establish safety guidelines for construction flame and spark sources.	**Construction:** **Wildland Fire:** Impacts would be similar to Alternative A, but with risk of fire reduced from human activity because the Project footprint is 12,339 acres smaller than Alternative A.	**Construction:** **Wildland Fire:** Impacts would be similar to Alternative A, but with risk of fire reduced from human activity because the Project footprint is 11,757 acres smaller than Alternative A.	**Construction:** **Wildland Fire:** Risk of wildland fire would not change from the current risk associated with recreational and other human source ignitions.	**Construction:** **Wildland Fire:** Overall, impacts would be similar to Alternatives A, but with risk of fire reduced from human activity because the Project footprint is 8,949 acres smaller than Alternative A if all Project phases are implemented; risk reduced further if Project footprint is further reduced by building fewer phases.
	Wildlife: **Small Mammals, Reptiles, and Amphibians** • Temporary and long-term loss of habitat from vegetation clearing and soil disturbance, with species inhabiting creosote scrub affected the most. • Approximately 3 percent of the available habitat in the Project Area lost or degraded. • Minor impacts related to individual mammals that could be injured, killed, or trapped in trenches, although mitigation measures would minimize the possibility of entrapment. **Mitigation:** • Identify species present before initiating construction. • Mow or crush vegetation (rather than removing it) in areas of temporary disturbance. • Limit vehicle and foot traffic. • Fill any trenches/holes immediately, or cover them at night and provide escape ramps, when not in use. • Implement an ecological awareness program.	**Construction:** **Small Mammals, Reptiles, and Amphibians** Similar to Alternative A except there would be a reduction in impacts due to fewer acres of temporary ground disturbance. The area subject to temporary ground disturbance with Alternative B is estimated at 1,234 acres, which is about 303 acres less than Alternative A.	**Construction:** **Small Mammals, Reptiles, and Amphibians** Similar to Alternatives A and B except impacts associated with ground disturbance and loss of habitat would be the less than Alternative A. The area subject to short-term ground disturbance with Alternative C is estimated at 1,264 acres, which is about 273 acres less than Alternative A and 30 acres more than Alternative B**.**	**Construction:** **Small Mammals, Reptiles, and Amphibians** No impacts.	**Construction:** **Small Mammals, Reptiles, and Amphibians** Construction of Alternative E would have effects similar to Alternatives A, B, and C except impacts associated with ground disturbance and loss of habitat would be the less than Alternative A, but more than Alternatives B and C. The area subject to short-term ground disturbance with Alternative E is estimated at 1,317 acres, which is about 220 acres less than Alternative A.
	Bats: • The California myotis, California leaf-nosed bat, Townsend's big eared bat, long-eared myotis, and cave myotis would experience loss of foraging habitat where wash vegetation is removed. • Blasting in mountainous areas could disturb roost sites for crevice roosting bats, which could impact up to 16 species that roost in crevices all the time or some of the time.	**Construction:** **Bats** Impacts would be similar to Alternative A except that the Project would have fewer turbines and avoid sensitive resources for bats and two unoccupied nest sites for golden eagles.	**Construction:** **Bats** Similar to Alternative B.	**Construction:** **Bats** No impacts.	**Construction:** **Bats** Similar to Alternative A, B, and C except Alternative E would have less impacts on bats due to the eagle nest avoidance area, curtailment zone, fewer turbines, and phased construction.

Resource	Possible Impacts				
	Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Mitigation: • Implement the Bat Conservation Strategy that has been developed for the Project. • Implement an ecological awareness program.				
	Big Game: • Habitat loss mainly to mule deer would be minimal (about 3 percent of the available habitat in Project Area) because vegetation types are widely available in the region. All other impacts to big game would be minimal based on the large use area of the big game species. • Construction noise could initiate alert of flight responses, and result in displacement of individuals or smaller populations in the Project Area, but the degree of impact is uncertain because the Project Area already experiences noise and human activity. **Mitigation:** • Limit vehicle and foot traffic. • Fill any trenches/holes immediately, or cover them at night and provide escape ramps, when not in use. • Implement an ecological awareness program.	**Construction:** **Big Game:** Similar to Alternative A except there would be a reduction in impacts on habitat due to fewer acres of temporary ground disturbance. The area subject to temporary ground disturbance with Alternative B is estimated at 1,234 acres, which is about 303 acres less than Alternative A.	**Construction:** **Big Game:** Similar to Alternatives A and B except impacts associated with ground disturbance and loss of habitat would be the less than Alternative A. The area subject to short-term ground disturbance with Alternative C is estimated at 1,264 acres, which is about 273 acres less than Alternative A and 30 acres more than Alternative B.	**Construction:** **Big Game:** No impacts.	**Construction:** **Big Game:** Similar impacts as Alternatives A, B, and C except the short-term disturbance area would be approximately 1,317 acres, assuming use of all phases, which could reduce impacts on big game habitat compared to A.
	Wild Burros: • It is unknown if burros utilize the Project Area, but if they do utilize the area; impacts would be similar to that discussed under Big Game. **Mitigation:** • Same as for those described for Big Game.	**Construction:** **Wild Burros:** Similar to Alternative A except there would be a reduction in impacts on habitat due to fewer acres of temporary ground disturbance. The area subject to temporary ground disturbance with Alternative B is estimated at 1,234 acres, which is about 303 acres less than Alternative A.	**Construction:** **Wild Burros:** Similar to Alternatives A and B except impacts associated with ground disturbance and loss of habitat would be the less than Alternative A. The area subject to short-term ground disturbance with Alternative C is estimated at 1,264 acres, which is about 273 acres less than Alternative A and 30 acres more than Alternative B.	**Construction:** **Wild Burros:** No impacts.	**Construction:** **Wild Burros:** Similar impacts as Alternatives A, B, and C except the short-term disturbance area would be approximately 1,317 acres, assuming use of all phases, which could reduce impacts on habitat compared to A.
	Birds: **Resident and Migratory Birds:** • Noise and human activity could contribute to alert or flight responses, interfere with vocal communication and breeding behavior, and lead to displacement of individuals. • Clearing of land could impact nests, eggs, or nestlings.	**Construction:** **Resident and Migratory Birds:** Impacts would be similar to Alternative A except that the Project boundary would avoid potential use regions for birds compared to Alternative A.	**Construction:** **Resident and Migratory Birds:** Similar to Alternatives A and B except impacts associated with ground disturbance and loss of habitat would be the less than Alternative A. The area subject to short-term ground disturbance with Alternative C is estimated at 1,264 acres, which is about 273 acres less than Alternative A and 30 acres more than Alternative B.	**Construction:** **Resident and Migratory Birds:** No impacts.	**Construction:** **Resident and Migratory Birds:** Similar impacts as Alternatives A, B, and C except the short-term disturbance area would be approximately 1,317 acres, assuming use of all phases, which could reduce impacts on habitat compared to A.

Resource	Possible Impacts Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Mitigation: • Complete pre-construction surveys to identify species and potential impacts to nest, eggs, or nestlings. • Design above ground lines to follow APLIC guidelines. • Use bird flight diverter devices, if needed. • Avoid non-mandatory night-lighting. • Clear vegetation during non-breeding season, or survey and flag to avoid destroying nests. • Develop and implement a bird conservation strategy. • Implement an ecological awareness program.				
	Raptors: • Raptors could be displaced or forced to forage over a greater area, due to the loss of vegetation and habitat for prey. • Noise and human activity could lead to displacement of individuals. **Mitigation:** • Same as those described for Resident and Migratory Birds. • Follow Arizona Game and Fish Department (AGFD) Burrowing Owl Project Clearance Guidance.	**Construction:** **Raptors:** Avoidance of mountainous habitat in the northwestern part and northeastern part of the Project Area, which contains habitat for, red-tailed hawks, falcons, and other raptor species, would result in less impacts to wildlife, BLM species of concern, and Arizona wildlife of concern than under Alternative A.	**Construction:** **Raptors:** Similar to Alternatives A and B except impacts associated with ground disturbance and loss of habitat would be the less than Alternative A and would avoid the mountain habitat in the northwestern and northeastern part of the Project Area.	**Construction:** **Raptors:** No impacts.	**Construction:** **Raptors:** The no-build and curtailment zone would reduce construction in areas with sensitive wildlife resources and reduce the risk of collision by golden eagles, other raptors and bats relative to Alternatives A, B and C.
	Game Birds: • Loss, fragmentation, or degradation of habitat in washes, and construction noise could contribute to decrease in local population. • Possible establishment of invasive plants or noxious weeds could reduce forage. • Noise from construction activities could temporarily initiate flight responses, inhibit breeding success, or lead to area abandonment. **Mitigation:** • Same as those described for Resident and Migratory Birds.	**Construction:** **Game Birds** Impacts would be similar to Alternative A except that the Project boundary would reduce potential use regions for birds compared to Alternative A.	**Construction:** **Game Birds** Similar to Alternatives A and B except impacts associated with ground disturbance and loss of habitat would be the less than Alternative A.	**Construction:** **Game Birds** No impacts.	**Construction:** **Game Birds** Similar impacts as Alternatives A, B, and C except the short-term disturbance area would be approximately 1,317 acres which could reduce impacts on habitat compared to A.
	Special Status Plants (BLM Sensitive Plants and Protected Arizona Native Plants) : • The BLM sensitive silverleaf sunray and four Arizona protected species (three cactus species and the Las Vegas bear poppy) may be disturbed from ground clearing activities. However, pre-construction surveys for species would identify avoidance areas. • The spread of noxious weeds and introduced plant species could threaten local plant populations. • Cacti and yucca may be salvaged and used for future revegetation.	**Construction:** **Special Status Plants** The configuration of Alternative B would avoid potential habitat for the silver leaf sunray and Las Vegas bear poppy.	**Construction:** **Special Status Plants** Alternative C would avoid potential silver leaf sunray and Las Vegas bear poppy habitat. The potential magnitude for impacts from ground disturbance would be reduced slightly compared to Alternative A, but would differ little from Alternative B. The short-term disturbance area would be about 1,264 acres, which is about 273 fewer acres than Alternative A.	**Construction:** **Special Status Plants** No impacts.	**Construction:** **Special Status Plants** Impacts on special status plants would be similar to Alternatives B, and C in avoiding potential silver leaf sunray and Las Vegas bear poppy habitat.

Resource	Possible Impacts				
	Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Mitigation: • Complete preconstruction surveys to identify sensitive or special status species. • Mow or crush vegetation (rather than removing it) in areas of temporary disturbance. • Limit vehicle and foot traffic. • Micro-site turbines, collector lines, and roads to avoid sensitive biological resources to the extent possible. • Locate other Project facilities away from sensitive areas or habitats to avoid further impacts on sensitive biological resources. • Develop and implement an Integrated Reclamation Plan to identify vegetation, soil stabilization, and erosion prevention measures to be implemented as soon as possible following construction of elements in the Project Area. • Conserve and redistribute native topsoil and associated seed bank of rare plant species.				
	Special Status Wildlife: • Potential degradation from temporary surface disturbance of approximately 524 acres of Category III habitat for the Sonoran desert tortoise (a federal candidate species). • Potential vehicle mortality to the tortoise. • Development could result in providing new areas for the construction of tortoise burrows, which would represent a positive impact to tortoise populations. • Spread of noxious weeds and introduced plant species could threaten tortoise food resources. • Blasting could cause tortoise burrows to collapse, and vehicle travel could crush the tortoise. • Impacts to BLM sensitive and Arizona wildlife of concern bat, bird, and raptor species would be the same as discussed in the species sections above. • Loss or degradation of habitat of about 67 acres of rocky and upland habitats in mountainous terrain for the Arizona protected banded Gila monster. **Mitigation:** • Conduct preconstruction surveys. • Follow AGFD guidelines for monitoring and handling of desert tortoise on construction projects. • Monitor construction activities using a qualified/certified desert tortoise monitor. • Mow or crush vegetation (rather than removing it) in areas of temporary disturbance. • Limit vehicle and foot traffic. • Monitor or provide internal support for tortoise burrows in blast areas. • Inspect, remove, and relocate on-site eggs and tortoises from burrows that would be destroyed by land clearing activities, and collapse burrows after removal. • Fill any trenches/holes immediately, or cover them at night and provide escape ramps, when not in use. • Implement an ecological awareness program.	**Construction:** **Special Status Wildlife** • Similar to Alternative A with the following differences: • Potential degradation from temporary surface disturbance of approximately 380 acres of Category III habitat for the Sonoran desert tortoise. • Potential disturbance or loss of habitat for the Gila monster would be a total of approximately 41 acres.	**Construction:** **Special Status Wildlife** • Similar to Alternative A with the following differences: • Potential degradation from temporary surface disturbance of approximately 412 acres of Category III habitat for the Sonoran desert tortoise. • Potential disturbance or loss of habitat for the Gila monster would be a total of approximately 36 acres.	**Construction:** **Special Status Wildlife** No impacts.	**Construction:** **Special Status Wildlife** • Similar to Alternative A with the following differences: • Potential degradation from temporary surface disturbance of approximately 384 acres of Category III habitat for the Sonoran desert tortoise. • Potential disturbance or loss of habitat for the Gila monster would be a total of approximately 42 acres.

Resource	Possible Impacts Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Golden Eagles: • Temporary surface disturbance could remove 1,537 acres of golden eagle foraging habitat, approximately 3 percent of the habitat available in the Project Area. **Mitigation:** • Same as those described for Resident and Migratory Birds. • Implement the Eagle Conservation Plan/Bird Conservation Strategy that has been prepared for this Project.	**Construction:** **Golden Eagles:** Impacts would be similar to Alternative A except the Project boundary would largely avoid mountainous habitat in the northwestern part of the Project Area near Squaw Peak and rocky uplands in the northeastern part of the Project Area including two unoccupied nest sites for golden eagles and a potential use region for golden eagles. The short-term disturbance area would be 1,234 acres, which is about 303 fewer acres than Alternative A.	**Construction:** **Golden Eagles:** • Similar to Alternatives A and B except the area subject to short-term ground disturbance with Alternative C is estimated at 1,264 acres, which is about 273 acres less than Alternative A and 30 acres more than Alternative B.	**Construction:** **Golden Eagles:** No impacts.	**Construction:** **Golden Eagles:** • Impacts would be similar to Alternatives A, B, and C except Alternative E would have less impact on golden eagles due to the eagle nest avoidance area curtailment zone, and phased construction.
	Operations and Maintenance: **Vegetation and Land Cover Types:** • Long-term disturbance to about 317 acres of vegetation. **Mitigation:** • Limit vehicle and foot traffic at facilities. **Noxious Weeds:** • Potential for introducing and spreading noxious weeds from vehicles traveling onto the site for routine delivery of materials. **Mitigation:** • Limit vehicle and foot traffic. • Implement an ecological awareness program. • Survey for noxious weeds and invasive species, and treat according to Integrated Reclamation Plan requirements.	**Operations and Maintenance:** **Vegetation and Land Cover Types:** Overall, impacts would be similar to Alternative A, but with proportionally lesser effects because the Project footprint and amount of surface disturbance would be smaller. Specific differences from Alternative A include: • Long-term disturbance to about 261 acres of vegetation. **Operations and Maintenance:** **Noxious Weeds** Impacts and the potential establishment of noxious weeds and invasive plant species would be reduced slightly compared to Alternative A. Long-term disturbance would reduce to about 261 acres, which is about 56 acres less than Alternative A.	**Operations and Maintenance:** **Vegetation and Land Cover Types:** Overall, impacts would be the same as Alternative B, but specific differences would include: • Long-term disturbance to about 268 acres of vegetation. **Operations and Maintenance:** **Noxious Weeds** Impacts would be similar to Alternatives A and B except the long-term disturbance for Alternative C would be about 269 acres, which is about 48 fewer acres than Alternative A and 8 acres more than Alternative B.	**Operations and Maintenance:** **Vegetation and Land Cover Types:** No impacts. **Operations and Maintenance:** **Noxious Weeds** No impacts.	**Operations and Maintenance:** **Vegetation and Land Cover Types:** Overall, impacts would be similar to Alternative A, but with proportionally lesser effects because the Project footprint and amount of surface disturbance would be smaller. Specific differences from Alternative A include: • Long-term disturbance to about 268 acres of vegetation. **Operations and Maintenance:** **Noxious Weeds** Impacts and the potential establishment of noxious weeds and invasive plant species would be reduced slightly compared to Alternative A. Long-term disturbance would reduce to about 268 acres, which is about 49 acres less than Alternative A.

Resource	Possible Impacts: Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Wildland Fire: • Although less than during construction, traffic and human activity would provide the potential for human sourced ignitions. • Potential for invasive plant species and noxious weeds and wildland fire to affect areas outside the disturbance footprint. **Mitigation:** • Remove vegetative fuel and manage weeds to help retain the current Class 2 condition. • Limit traffic to only essential vehicles in the facilities areas. • Establish safety guidelines for maintenance related flame and spark sources.	**Operations and Maintenance: Wildland Fire** The potential risk of and impacts from wildland fire would decrease slightly compared to Alternative A, due to fewer disturbance acres. The long-term disturbance would reduce to about 261 acres, which is about 56 acres less than Alternative A.	**Operations and Maintenance: Wildland Fire** The potential for impacts from wildland fire under Alternative C would decrease slightly compared to Alternative A due to a smaller area of ground disturbance, but would differ little from Alternative B.	**Operations and Maintenance: Wildland Fire** No impacts.	**Operations and Maintenance: Wildland Fire** Alternative E would have less potential magnitude for wildland fire impacts based on ground disturbance than Alternative A and the effects would be similar to Alternatives B and C.
	Wildlife: **Small Mammals, Reptiles, and Amphibians** • Chronic noise could mask communication, impede detection of predators, and increase vigilance behavior. • Noise combined with human presence could indirectly add to the displacement of individual mammals. • Following reclamation of construction activities, small mammal diversity could increase. **Mitigation:** • Limit vehicle and foot traffic. • Implement an ecological awareness program. • Adhere to noise mitigation (presented in noise section below). • Enforce an on-site 25 mile per hour speed limit.	**Operations and Maintenance: Small Mammals, Reptiles, and Amphibians** The types of direct and indirect impacts on wildlife that could occur during operations would not differ from Alternatives A, but the magnitude of the effects would be less. The long-term disturbance area would be about 261 acres, which is about 56 acres less than with Alternative A. The potential for collisions with vehicles also would decrease under Alternative B	**Operations and Maintenance: Small Mammals, Reptiles, and Amphibians** The magnitude of the effects would be less with Alternative C than Alternative A and similar to Alternative B. The long-term disturbance area would be about 269 acres, which is about 49 fewer acres than Alternative A, and 8 acres more than Alternative B.	**Operations and Maintenance: Small Mammals, Reptiles, and Amphibians** No impacts.	**Operations and Maintenance: Small Mammals, Reptiles, and Amphibians** Similar to Alternatives B and C, but the long-term disturbance area would be about 268 acres. The no-build and curtailment zone would reduce construction in areas with wildlife resources and reduce the risk of collision by golden eagles, other raptors and bats relative to Alternatives A, B and C.
	Bats: • An estimated 2.17 to 4.29 bat fatalities/MW/year (in relative and not absolute numbers) could occur from collisions with wind turbines. • Bats could develop barotrauma (condition in which the lungs of bats are fatally damaged from the negative pressure created around operating turbines). • Turbine noise could impede echolocation, resulting in decreased foraging efficiency.	**Operations and Maintenance: Bats** The potential for fatal collisions with wind turbines would decrease under Alternative B. The Project could accommodate a maximum of about 166 to 208 turbines which would be about 75 fewer than for Alternative A. Avoiding potential use areas for bats and birds near Squaw Peak and the northeastern part of the Project Area would further decrease the potential for turbine fatalities.	**Operations and Maintenance: Bats** For bats, the potential for fatal collisions with wind turbines also would decrease compared to Alternative A and would be the same as Alternative B. Like Alternative B, Alternative C also would avoid the same potential risk and sensitive areas that are near Squaw Peak and in the northeastern part of the Alternative A Project boundary.	**Operations and Maintenance: Bats** No impacts.	**Operations and Maintenance: Bats** Alternative E is estimated to have a maximum of 243 turbines, and the curtailment area reduce the potential for fatal collisions relative to Alternative A. Similar to Alternative B and C, turbines would not be constructed in the Squaw Peak area which could reduce collision risk and disturbance. If fewer turbines were constructed to meet the required nameplate generation capacity, there could be even less impact on bats due to the reduction in collision risk and disturbance.

Resource	Possible Impacts: Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Mitigation: • Implement the Bat Conservation Strategy that has been developed for the Project. • Implement an ecological awareness program. • Adhere to noise mitigation (presented in noise section below).				
	Big Game: • Changes in behavior would decrease because of less human activity in the Project Area than during construction. **Mitigation:** • None required.	**Operations and Maintenance:** **Big Game** Similar to Alternative A, but the magnitude of the effects would be less. The long-term disturbance area would be about 261 acres, which is about 56 acres less than with Alternative A.	**Operations and Maintenance:** **Big Game** Similar to Alternative A, but the magnitude of the effects would be less. The long-term disturbance area would be about 269 acres, which is about 49 fewer acres than Alternative A, and 8 acres more than Alternative B.	**Operations and Maintenance:** **Big Game** No impacts.	**Operations and Maintenance:** **Big Game** The no-build and curtailment zone in Alternative E would reduce impacts from operation and maintenance in areas with sensitive resources. Impacts from long-term ground disturbance would be about 268 acres, which is similar to Alternatives B and C.
	Wild Burros: • It is unknown if burros utilize the Project Area, but if they do utilize the area; impacts would be similar to that discussed under Big Game. **Mitigation:** • None required.	**Operations and Maintenance:** **Wild Burros:** Impacts on wild burros from operations and maintenance would be the same as the impacts on big game.	**Operations and Maintenance:** **Wild Burros:** Impacts on wild burros from operations and maintenance would be the same as the impacts on big game .	**Operations and Maintenance:** **Wild Burros:** No impacts.	**Operations and Maintenance:** **Wild Burros:** Impacts on wild burros from operations and maintenance would be the same as the impacts on big game.
	Birds: **Resident and Migratory Birds:** • Injury or death could occur from colliding with turbines, and other facilities on the Wind Farm Site; however, the risk is low. • Noise from operating turbines could indirectly impact through displacement, or by impeding local breeding songs. **Mitigation:** • Use bird flight diverter devices, if needed. • Avoid non-mandatory night-lighting. • Develop and implement a bird conservation strategy. • Implement an ecological awareness program. • Adhere to noise mitigation (presented in noise section below).	**Operations and Maintenance:** **Resident and Migratory Birds:** For birds, the potential for fatal collisions with wind turbines would decrease under Alternative B. The Project could accommodate a maximum of about 166 to 208 turbines which would be about 75 fewer than for Alternative A. Avoiding potential use areas for birds near Squaw Peak and the northeastern part of the Project Area would further decrease the potential for turbine fatalities.	**Operations and Maintenance:** **Resident and Migratory Birds:** Similar to Alternative B.	**Operations and Maintenance:** **Resident and Migratory Birds:** No impacts.	**Operations and Maintenance:** **Resident and Migratory Birds:** The no-build and curtailment zone in Alternative E would reduce impacts from operations and maintenance in areas with sensitive resources. Alternative E would have a maximum of 243 turbines, and may have fewer if not all phases are required to meet nameplate generation requirements.

Resource	Possible Impacts Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Raptors: • Fewer than 5 fatalities per year are estimated from raptors colliding with turbine blades, with the red-tailed hawks at a greater risk, because they are the most common raptor in the area. • Possible fatality or injury from strikes with other structures on the Wind Farm Site. • Noise could impede local use of the Project Area, but the impact is unlikely to affect raptor use in the long term. **Mitigation:** • Same as those described for Resident and Migratory Birds.	**Operations and Maintenance:** **Raptors:** The potential for fatal collisions with wind turbines would decrease under Alternative B. The Project could accommodate a maximum of about 166 to 208 turbines which would be about 75 fewer than for Alternative A which could decrease raptor fatalities.	**Operations and Maintenance:** **Raptors:** The potential for fatal raptor collisions with wind turbines would be the same as Alternative B.	**Operations and Maintenance:** **Raptors:** No impacts.	**Operations and Maintenance:** **Raptors:** Alternative E could accommodate a maximum of 243 turbines and may be less if not all construction phases are required to meeting nameplate generation requirements. Alternative E also would avoid the most sensitive raptor uses areas due to the eagle nest avoidance area and the curtailment zone. The removal of turbines around the Squaw Peak golden eagle breeding area is expected to reduce collision risk for golden eagles, other raptors, and bats.
	Game Birds: • Flight responses could be initiated from turbine noise, but the magnitude of impacts is unknown. **Mitigation:** • Same as those described for Resident and Migratory Birds. **Special Status Plants (BLM Sensitive Plants and Protected Arizona Native Plants):** • Potential indirect impacts to habitat from noxious weeds and introduced plant species. **Mitigation:** • Limit vehicle and foot traffic. • Implement an ecological awareness program. • Survey for noxious weeds and invasive species, and treat according to Integrated Reclamation Plan requirements.	**Operations and Maintenance:** **Game Birds:** Same as those described for Resident and Migratory Birds. **Operations and Maintenance:** **Special Status Plants** Similar to Alternative A. Long-term indirect impacts from noxious weeds and invasive plant would be reduced slightly compared to Alternative A because the long-term impact from ground disturbance would reduce to about 261 acres, which is about 56 acres less than Alternative A.	**Operations and Maintenance:** **Game Birds:** Same as those described for Resident and Migratory Birds. **Operations and Maintenance:** **Special Status Plants** Similar to Alternative B. Alternative C would result in about 269 acres of long-term disturbance, which is about 48 fewer acres than Alternative A.	**Operations and Maintenance:** **Game Birds:** No impacts. **Operations and Maintenance:** **Special Status Plants** No impacts.	**Operations and Maintenance:** **Game Birds:** Same as those described for Resident and Migratory Birds. **Operations and Maintenance:** **Special Status Plants** Similar to Alternative C. Long-term disturbance for Alternative E would be about 268 acres, which is about 49 acres fewer than Alternative A.
	Special Status Wildlife: • Possibility of noxious weed infestation could indirectly reduce the quality of tortoise and banded Gila monster habitat. • Possibility for collisions of the tortoise and banded Gila monster from vehicles. • Impacts to BLM sensitive and Arizona wildlife of concern bat, bird, and raptor species would be the same as discussed in the species sections above.	**Operations and Maintenance:** **Special Status Wildlife:** Similar to Alternative A except long-term impacts from ground disturbance would reduce to about 261 acres, which is about 56 acres less than Alternative A.	**Operations and Maintenance:** **Special Status Wildlife:** Impacts based on a ground disturbance would be less than Alternative A and the effects would be similar to Alternative B. The long-term disturbance for Alternative C would be about 269 acres, which is about 48 acres less than Alternative A and 8 acres more than Alternative B.	**Operations and Maintenance:** **Special Status Wildlife:** No impacts.	**Operations and Maintenance:** **Special Status Wildlife:** Similar to Alternatives B and C. Long-term disturbance for Alternative E would be about 268 acres, which is about 49 acres fewer than Alternative A.

Resource	Possible Impacts				
	Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Mitigation: • Monitor construction activities using a qualified/certified desert tortoise monitor. • Limit vehicle and foot traffic. • Implement an ecological awareness program. • **Golden Eagles:** • Modeling conservatively estimates there could be up to 0.33 golden eagle fatalities per year if 283 turbines were constructed. • Potential mortality of 1.65 golden eagle fatalities over a 5-year period and 9.9 eagle fatalities over the anticipated 30-year life of the Project from turbine collisions and other structures. The estimate of fatalities is conservative and the actual number of fatalities could vary from these projections. The exposure risk to golden eagles is low based on the small numbers of observed eagles and the small proportion of flights within rotor swept heights. **Mitigation:** • Same as those described for Resident and Migratory Birds. Implement the Eagle Conservation Plan/Bird Conservation Strategy that has been prepared for this Project.	**Operations and Maintenance:** • Modeling conservatively estimates that there could be up to 0.24 golden eagle fatalities per year if 208 turbines were constructed.	**Operations and Maintenance:** • Modeling conservatively estimates that there could be up to 0.24 golden eagle fatalities per year if 208 turbines were constructed.	**Operations and Maintenance:** No impacts.	**Operations and Maintenance:** Alternative E is would have a maximum of 243 turbines, and could have fewer turbines if all phases are not needed to meeting nameplate generation requirements. The estimated golden eagle fatalities would be fewer than Alternative A, but potentially more than Alternatives B and C is more turbines are constructed. However, Alternative E has a golden eagle avoidance area and curtailment area designed to limit operations in the most sensitive golden eagle habitat, potentially resulting in the least operational impacts of the action alternatives. **Mitigation Measures:** • Implement golden eagle avoidance area and curtailment zone. To avoid possible eagle nest mortality, turbines would be shut down daily from 11:00 a.m. to 4:00 p.m. between December 1 and March 15, and from 4 hours after sunrise until 2 hours before sunset between March 16 and September 30, or when certain biological criteria identified in the Eagle Conservation Plan have been met. Data would be evaluated periodically to determine if and when the curtailment zone requirements might end.
	Decommissioning: **Vegetation and Land Cover Types:** • Some vegetation would be removed during activities to remove infrastructure. • Following decommissioning and reclamation, disturbed areas should resemble the original vegetation community at an early stage of ecological succession. **Mitigation:** • Same as Construction mitigation for Alternatives A, B, C and E.	**Decommissioning:** Overall, impacts would be similar to Alternative A. Until reclamation is complete, there would be proportionally lesser short-term effects because the Project footprint and amount of surface disturbance from removal of Project features would be smaller.	**Decommissioning:** • Same as Alternative B.	**Decommissioning:** No impacts.	**Decommissioning:** • Same as Alternative B.

Resource	Possible Impacts				
	Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Noxious Weeds: • Same as Construction impacts. **Mitigation:** • Same as Construction mitigation for Alternatives A, B, C and E.				
	Wildland Fire: • Ground re-disturbance would increase the potential to introduce or spread invasive plants or noxious weeds. **Mitigation:** • Remove vegetative fuel and manage weeds to help retain the current Class 2 condition for Alternatives A, B, C and E.	**Decommissioning:** **Wildland Fire** Overall, impacts would be similar to Alternative A, but with proportionally lesser effects because the Project footprint and amount of surface disturbance would be smaller.	**Decommissioning:** **Wildland Fire** Similar to Alternative B.	**Decommissioning:** **Wildland Fire** No impacts.	**Decommissioning:** **Wildland Fire** Impacts would be less than those under the Alternative A and similar to Alternatives B and C.
	Wildlife: **Small Mammals, Reptiles, and Amphibians** • Similar to Construction, and impacts would continue until disturbed areas are revegetated. **Mitigation:** • Same as Construction for Alternatives A, B, C, and E.	**Decommissioning:** **Small Mammals, Reptiles, and Amphibians** Impacts are similar to construction under Alternative B.	**Decommissioning:** **Small Mammals, Reptiles, and Amphibians** Impacts are similar to construction under Alternative C.	**Decommissioning:** **Small Mammals, Reptiles, and Amphibians** No impacts.	**Decommissioning:** **Small Mammals, Reptiles, and Amphibians** Impacts are similar to construction under Alternative E.
	Bats: • Similar to Construction. **Mitigation:** • Same as Construction.	**Decommissioning:** **Bats:** Impacts are similar to construction under Alternative B.	**Decommissioning:** **Bats:** Impacts are similar to construction under Alternative C.	**Decommissioning:** **Bats:** No impacts.	**Decommissioning:** **Bats:** Impacts are similar to construction under Alternative E.
	Big Game: • Similar to Construction. **Mitigation:** • Same as Construction.	**Decommissioning:** **Big Game** Impacts are similar to construction under Alternative B.	**Decommissioning:** **Big Game** Impacts are similar to construction under Alternative C.	**Decommissioning:** **Big Game** No impacts	**Decommissioning:** **Big Game** Impacts are similar to construction under Alternative E.
	Wild Burros: • It is unknown if burros utilize the Project Area, but if they do utilize the area; impacts would be similar to that discussed under Big Game. **Mitigation:** • Same as Construction.	**Decommissioning:** **Wild Burros** Impacts are similar to construction under Alternative B.	**Decommissioning:** **Wild Burros** Impacts are similar to construction under Alternative C.	**Decommissioning:** **Wild Burros** No Impacts	**Decommissioning:** **Wild Burros** Impacts are similar to construction under Alternative E.
	Birds: **Resident and Migratory Birds:** • Similar to Construction. **Mitigation:** • Same as Construction.	**Decommissioning:** **Resident and Migratory Birds:** Impacts are similar to construction under Alternative B.	**Decommissioning:** **Resident and Migratory Birds:** Impacts are similar to construction under Alternative C.	**Decommissioning:** **Resident and Migratory Birds:** No Impacts.	**Decommissioning:** **Resident and Migratory Birds:** Impacts are similar to construction under Alternative E.
	Raptors: • Similar to Construction. **Mitigation:** • Same as Construction.	**Decommissioning:** **Raptors:** Impacts are similar to construction under Alternative B.	**Decommissioning:** **Raptors** Impacts are similar to construction under Alternative C.	**Decommissioning:** **Raptors** No Impacts.	**Decommissioning:** **Raptors** Impacts are similar to construction under Alternative E.
	Game Birds: • Similar to Construction. **Mitigation:** • Same as Construction.	**Decommissioning:** **Game Birds** Impacts are similar to construction under Alternative B.	**Decommissioning:** **Game Birds** Impacts are similar to construction under Alternative C.	**Decommissioning:** **Game Birds** No Impacts	**Decommissioning:** **Game Birds** Impacts are similar to construction under Alternative E.

Resource	Possible Impacts				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D – No Action**	**Alternative E – Agencies' Preferred Alternative**
	Special Status Plants (BLM Sensitive Plants and Protected Arizona Native Plants) : • Similar to Construction. **Mitigation:** • Same as Construction. **Special Status Wildlife:** • Similar to Construction. **Mitigation:** • Same as Construction. **Golden Eagles:** • Similar to Construction. **Mitigation:** • Same as Construction.	**Decommissioning:** **Special Status Plants** Impacts are similar to construction under Alternative B. **Decommissioning:** **Special Status Wildlife:** Impacts are similar to construction under Alternative B. **Decommissioning:** **Golden Eagles:** Impacts are similar to construction under Alternative B.	**Decommissioning:** **Special Status Plants** Impacts are similar to construction under Alternative C. **Decommissioning:** **Special Status Wildlife:** Impacts are similar to construction under Alternative C. **Decommissioning:** **Golden Eagles:** Impacts are similar to construction under Alternative C.	**Decommissioning:** **Special Status Plants** No Impacts **Decommissioning:** **Special Status Wildlife:** No Impacts **Decommissioning:** **Golden Eagles:** No impacts.	**Decommissioning:** **Special Status Plants** Impacts are similar to construction under Alternative E. **Decommissioning:** **Special Status Wildlife:** Impacts are similar to construction under Alternative E. **Decommissioning:** **Golden Eagles:** Impacts are similar to construction under Alternative E.
Cultural Resources	**Construction:** **Archaeological and Historical Resources**: • Nine prehistoric sites determined as eligible for the National Register: ○ Impacts to two sites near existing roads potentially may be avoided so impacts are expected to be negligible. ○ Seven sites potentially may be affected by siting of the turbines, depending on final engineering design. • A segment of Stone's Ferry Road that does not contain historical artifacts or features could be disturbed by the main access road. **Mitigation:** • Develop and implement a Memorandum of Agreement (MOA) with SHPO, Federal agencies, tribes, and BP Wind Energy (included as Appendix G in this Final EIS). • As stipulated by the MOA develop and implement a historic properties treatment plan. • Prepare a Native American Graves Protection and Repatriation Act plan of action. **Traditional Cultural Resources Sensitive to Visual Impacts**: • Two National Register-eligible traditional Hualapai cultural resources adversely affected by visual impacts: Wi Knyimáya (Squaw Peak) and Wi Hla'a (Senator Mountain). • One traditional cultural resource listed in the National register (Gold Strike Canyon-Sugarloaf Mountain) and one traditional cultural resource considered eligible for the National Register (Mat Kwata [Red Lake]) not affected. **Mitigation:** • Develop educational programs, curriculum materials, or public outreach designed to preserve information about the traditional cultural importance of the area for the Hualapai Tribe and to reinforce the Tribe's continuing cultural connections to the area.	**Construction:** **Archaeological and Historical Resources**: • Potential impacts on historic sites same as Alternative A. **Traditional Cultural Resources Sensitive to Visual Impacts** • Similar to Alternative A except reducing the number of turbines would reduce impacts on Wi Knyimáya (Squaw Peak) and Wi Hla'a (Senator Mountain) relative to Alternative A.	**Construction:** **Archaeological and Historical Resources**: • Potential impacts on historic sites same as Alternative A. **Traditional Cultural Resources Sensitive to Visual Impacts** • Similar to Alterative B.	**Construction:** Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts: • No impact from the Project. Cultural resources would continue to be subject to impacts of ongoing land uses and any modification of those uses approved in the future.	**Construction:** **Archaeological and Historical Resources**: • One prehistoric archaeological site is in the curtailment area but could still be disturbed by turbine and access road/electrical collector line construction. **Traditional Cultural Resources Sensitive to Visual Impacts** • Similar to Alternative B except the no-build area would eliminate turbines corridors within the eagle nest avoidance area. This could further reduce impacts on Wi Knyimáya (Squaw Peak) relative to Alternatives B and C but eliminate fewer turbines in the vicinity of Wi Hla'a (Senator Mountain).

<table>
<tr><th rowspan="2">Resource</th><th colspan="5">Possible Impacts</th></tr>
<tr><th>Alternative A</th><th>Alternative B</th><th>Alternative C</th><th>Alternative D – No Action</th><th>Alternative E – Agencies' Preferred Alternative</th></tr>
<tr><td></td><td>Operations and Maintenance:
• No change from impacts during construction.
Mitigation:
• As stipulated by the MOA develop and implement a historic properties treatment plan.
• Prepare a Native American Graves Protection and Repatriation Act plan of action.</td><td>Operations and Maintenance:
Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts:
• Similar to Alternative A.</td><td>Operations and Maintenance:
Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts
• Similar to Alternative A.</td><td>Operations and Maintenance:
Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts
No impacts.</td><td>Operations and Maintenance:
Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts:
• Similar to Alternative A.</td></tr>
<tr><td></td><td>Decommissioning:
Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts:
• No change from impacts during construction.
Mitigation:
• Same as Operations and Maintenance</td><td>Decommissioning:
Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts:
• Similar to Alternative A.</td><td>Decommissioning:
Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts:
• Similar to Alternative A.</td><td>Decommissioning:
Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts:
No impacts.</td><td>Decommissioning:
Archaeological and Historical Resources and Traditional Cultural Resources Sensitive to Visual Impacts:
• Similar to Alternative A.</td></tr>
<tr><td rowspan="2">Paleontological Resources</td><td>Construction, Operations and Maintenance, and Decommissioning:
Records search identified no known paleontological localities within the Project Area, or within 10 miles of the Project. The Quaternary deposits in the area have the potential to produce significant paleontological resources based on similar deposits elsewhere in Arizona. Excavation may uncover these resources. Preconstruction activities would require a pedestrian survey conducted by a qualified paleontologist.</td><td>Construction, Operations and Maintenance, and Decommissioning:
• Similar to Alternative A, although Alternative B has the fewest square miles of Quaternary deposits of the action alternatives.</td><td>Construction, Operations and Maintenance, and Decommissioning:
• Similar to Alternative A, although fewer square miles of Quaternary deposits.</td><td>Construction, Operations and Maintenance, and Decommissioning:
No impacts.</td><td rowspan="2">Construction, Operations and Maintenance, and Decommissioning:
• Similar to Alternative B, however, disturbance may be less if fewer turbines are constructed to meet nameplate generation capacity.</td></tr>
<tr><td>Mitigation:
• Stabilize and prepare any collected paleontological resources to the point of identification, and curate them in a museum.
• Submit final reports of findings to BLM/Reclamation after construction and decommissioning activities.</td><td></td><td></td><td></td></tr>
<tr><td>Land Use</td><td>Construction:
• Light industrial uses, small mining claims, livestock grazing allotments, residential land uses, and a private airstrip adjacent to the Project Area could be affected by temporary access restrictions.
• Dust and noise and additional vehicle traffic could increase temporarily and impact nearby residences.
• Construction activities would change the character of semi-primitive recreational experience.
• Public access to the Project Area would be restricted, but use numbers in the area are not known, and the impact would be short term.
• Construction related traffic may cause temporary delays in traffic accessing Mount Wilson Wilderness Area.
• Loss of vegetation, possible increase in invasive plants and noxious weeds, and dust on forage for livestock in Big Ranch Units A and B would be localized with negligible impacts on grazing opportunities.
Mitigation:
• Continue contact with appropriate agencies, property owners, and other stakeholders during permitting to identify potentially sensitive land uses and local and regional land use concerns.
• Maintain conformance with existing land use plans,
• Implement mitigation measures in the Dust Control Plan and reclamation as described in the Integrated Reclamation Plan.</td><td>Construction:
• Similar to Alternative A, but reduced visual, noise, and dust impacts to residents and recreational visitors compared with Alternative A due to 303 fewer acres of temporary disturbance.
• Traffic delays could be reduced compared to Alternative A, because fewer turbine components would be delivered to the site.</td><td>Construction:
• Similar to Alternative B. Impacts from temporary ground disturbance would be similar to Alternative A, but there would be approximately 273fewer acres disturbed.</td><td>Construction
No impacts.</td><td>Construction:
• Similar to Alternative B. Impacts from temporary ground disturbance would be similar to Alternative A, but there would be approximately 220 fewer acres disturbed. Temporary ground disturbance could be less if fewer turbine corridors are needed to meet nameplate generation requirements.
• Reduced visual, noise and dust impacts to residents compared with Alternatives A.</td></tr>
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<table>
<tr><th rowspan="2">Resource</th><th colspan="5">Possible Impacts</th></tr>
<tr><th>Alternative A</th><th>Alternative B</th><th>Alternative C</th><th>Alternative D – No Action</th><th>Alternative E – Agencies' Preferred Alternative</th></tr>
<tr><td></td><td>Operations and Maintenance:
• May influence the location of future residential developments.
• Aircraft would not be able to operate at low levels within the airspace of the Project, which could influence take-off and landing patterns at Triangle Airpark.
• Operation and visual effects of the wind farm would reduce the opportunity for a semi-primitive recreational experience; however, the area is not managed by BLM for specific recreational values. Opportunity for natural vistas from Temple Bar Road would be reduced, potentially diminishing the recreational experience at Lake Mead NRA.
• Minor localized impacts on livestock and grazing opportunities through loss of forage in development areas. Development of new access roads could provide better access for lessees with grazing livestock.
Mitigation:
• Maintain conformance with existing land use plans.</td><td>Operations and Maintenance:
• Smaller development area for wind farm would reduce impacts for future residential developments compared with Alternative A.
• Reduced noise and visual impacts compared with Alternative A from the construction of fewer turbines.
• Operations would change the character of solitude and semi-primitive recreation opportunities, but reduced size of the Project compared with Alternative A would result in a lesser effect, particularly for visitors to Lake Mead NRA because the boundary of the Project would not abut the NRA.
• Reduced potential displacement of livestock from Alternative A.</td><td>Operations and Maintenance:
• Smaller development area for wind farm particularly near existing and proposed residential areas would reduce impacts (such as noise, proximity of access roads) compared with Alternatives A and B.
• Similar impact on recreational experience as Alternative B except one additional turbine corridor on Reclamation land would result in turbines nearer to the recreational activities at Lake Mead NRA.
• Same as Alternative B for displacement of livestock.</td><td>Operations and Maintenance:
No impacts.</td><td>Operations and Maintenance:
• Smaller development area for wind farm would reduce impacts for some future residential developments compared with Alternative A, particularly if some phases are not needed to meet nameplate generation requirements.
• Reduced noise and visual impacts compared to Alternative A if some phases are not required.
• The no build area would reduce impacts relative to Alternatives A, B and C on semi-primitive recreation opportunities as turbines would not be constructed in this area.
• Compared with Alternative A would result in a lesser effect, for visitors to Lake Mead NRA because the boundary of the Project would not abut the NRA.</td></tr>
<tr><td></td><td>Decommissioning:
• Most impacts similar to construction activities except removal of facilities would initiate restoration of natural environment for recreational experience.
• If BLM and Reclamation reclaim access roads, the landscape would transition back to semi-rural development area. If roads are not reclaimed, access for recreation would remain.
• Revegetation activities would restore existing forage availability and opportunities for livestock grazing.
Mitigation:
• Maintain conformance with existing land use plans and the Project Decommissioning Plan.</td><td>Decommissioning:
• Same as Alternative A except noise and dust impacts would be reduced because there would be fewer turbines to decommission. This could reduce traffic delays in site specific areas and to access Mount Wilson Wilderness, Lake Mead NRA, and Hoover Dam.</td><td>Decommissioning:
• Same as Alternative B.</td><td>Decommissioning:
No impacts.</td><td>Decommissioning:
• Same as Alternative B.</td></tr>
<tr><td>Transportation and Access</td><td>Construction:
• New access road would be developed from US 93 to the Wind Farm Site, eliminating the need for access to the site via existing roads.
• Increase in vehicular traffic within the Project Area, and the surrounding areas.
• Proposed peak construction schedule could temporarily increase daily traffic volume along US 93 by 4 percent over the existing level between the Arizona/Nevada State Line and Pierce Ferry Road, but would not be considered a negative impact on existing traffic.
• Estimated number of round trips for all construction related vehicles is estimated to be between 55,930 to 80,930. The range represents the number of estimated trips based on the construction schedule and needs. Of these trips, roughly 2,830 round trips would be for turbine deliveries; these oversized and slow-moving transport vehicles on US 93 could result in some traffic delays.
• OHV use would be limited due to construction activity to protect public safety.</td><td>Construction:
• Construction traffic and OHV access would be the similar to Alternative A, but there could be less traffic because fewer turbines would be constructed.</td><td>Construction:
• Construction traffic and OHV access would be the same as Alternative B.</td><td>Construction:
The existing traffic along US 93 in the vicinity of the Project Area would remain consistent and grow in accordance with Arizona Department of Transportation traffic projections.</td><td>Construction:
• The road network associated with Alternative E (see Maps 2-11 to 2-13) is similar to the access roads identified with Alternative B, but with the omission of roads in the no build area; there could be less construction traffic and fewer changes to OHV access in this portion of the Project Area.</td></tr>
</table>

Resource	Possible Impacts: Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Mitigation: • Implement the Transportation and Traffic Plan, Blasting Plan (if one is required), and Dust and Emissions Control Plan. • Survey and flag areas to avoid disturbing areas with sensitive resources. • Obtain appropriate permits for transporting oversized loads and closely coordinate with ADOT and other state transportation departments.				
	Operations and Maintenance: • Minor to no impact on traffic or access along US 93. • Some fenced areas (such as the O&M building) would be necessary, limiting access for OHV use. **Mitigation:** • Coordinate with ADOT and other state transportation departments, if needed, to transport oversized loads as part of maintenance activities.	**Operations and Maintenance**: • Same as Alternative A.	**Operations and Maintenance**: • Same as Alternative A.	**Operations and Maintenance:** No impacts.	**Operations and Maintenance**: • Same as Alternative A.
	Decommissioning: • Similar impacts as those from Construction, except aggregate and water trucks for mixing concrete (approximately 1,300 trips) would not be required. **Mitigation:** • Same as Construction.	**Decommissioning**: • Same as Alternative A.	**Decommissioning**: • Same as Alternative A.	**Decommissioning:** No impacts.	**Decommissioning**: • Same as Alternative A
Social and Economic Conditions	**Construction**: **Employment and Income:** • Workforce during construction to be 300 to 500 workers (during peak). The range represents the estimated personnel that would be needed, which would be variable during different stages of construction. Total income for all construction workers is estimated at $21.2 million, of which an estimated $2.9 million is for local workers (workers who currently reside in Mohave County). • Estimated expenditures for local goods and materials such as construction supplies would support 290 jobs. • Negligible economic impact on grazing rental leases, recreation visitor expenditures, and number of recreationists.	**Construction**: **Employment and Income:** • Same as Alternative A because income is estimated based on the MW of capacity rather than the number of turbines.	**Construction**: **Employment and Income:** • Same as Alternative A.	**Construction**: **Employment and Income:** No impacts.	**Construction**: **Employment and Income:** • Same as Alternative A.
	Fiscal Effects • Total tax revenue in Arizona from Project construction is estimated at approximately $11.1 million, primarily in transaction privilege tax and use tax accruing to the State. • Mohave County is anticipated to receive approximately $366,000 over the construction period of the Project, while local purchases of goods and labor is anticipated to generate nearly $900,000 in tax revenue for cities within the county.	**Construction**: **Fiscal Effects** • Same as Alternative A.	**Construction**: **Fiscal Effects** • Same as Alternative A.	**Construction**: **Fiscal Effects** No impacts.	**Construction**: **Fiscal Effects** • Same as Alternative A.
	Other Quality of Life Effects • The maximum population increase at any one time in Mohave County directly due to construction is estimated at 240 people; for which there are adequate available, vacant housing units. • Project construction is anticipated to support an additional 380 jobs that are not specialized, and it is expected that most of these jobs would be filled by local residents. **Mitigation:** • No mitigation measures needed because income, employment, and tax revenue effects are expected to be positive.	**Construction**: **Other Quality of Life Effects** • Similar to Alternative A, except the effects would be reduced relative to the fewer turbines constructed and the smaller overall Project footprint.	**Construction**: **Other Quality of Life Effects** • Similar to Alternative A, but with a reduced effect on quality of life due to the greater separation between private lands and turbines.	**Construction**: **Other Quality of Life Effects** No impacts.	**Construction**: **Other Quality of Life Effects** • Similar to Alternative A, some minor adverse impacts to quality of life, particularly during the temporary construction and decommissioning periods, may occur due to effects of Alternative E on air quality, water quality and quantity, recreation, and wildlife and habitat.

<table>
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<tr><th>Alternative A</th><th>Alternative B</th><th>Alternative C</th><th>Alternative D – No Action</th><th>Alternative E – Agencies' Preferred Alternative</th></tr>
<tr><td></td><td>Operations and Maintenance:
• An estimated 30 workers would be employed to maintain and operate the turbines, with total income of $1.9 million.
• During operations (expected to last 30 years), total employment and income supported by Project operations (including direct, indirect and induced effects) is estimated to be 50 jobs and $2.6 million in income annually.
• Tax revenue is estimated at $587,000 annually, with the majority accruing to jurisdictions in Mohave County as property tax. The anticipated annual tax revenue for the State is approximately $197,000. At current tax rates, tax revenues to Mohave County and its municipalities are estimated at $350,000, nearly all of which is in property taxes.
• Long-term population impacts on the county would be less than 50 people, for which there are adequate available, vacant housing units.
Mitigation:
• No mitigation measures needed because income, employment, and tax revenue effects are expected to be positive.</td><td>Operations and Maintenance:
• Similar to Alternative A because the number of workers would remain the same.</td><td>Operations and Maintenance:
• Similar to Alternative A because the number of workers would remain the same.</td><td>Operations and Maintenance:
No impacts.</td><td>Operations and Maintenance:
• Similar to Alternative A because the number of workers would remain the same.</td></tr>
<tr><td></td><td>Decommissioning:
• There would be some income tax generated and likely some transaction privilege tax or use tax on construction services or materials purchased for decommissioning.
Mitigation:
• No mitigation measures needed because income and employment effects are expected to be positive.</td><td>Decommissioning:
Similar to Alternative A, except quality of life environmental impacts would be reduced because there would be fewer turbines.</td><td>Decommissioning:
Similar to Alternative B, except quality of life environmental impacts would be further reduced because there would be greater space between the private lands and nearest turbines.</td><td>Decommissioning:
No impacts.</td><td>Decommissioning:
• Similar to Alternative B.</td></tr>
<tr><td>Environmental Justice</td><td>Construction:
• The Census Tract that would be impacted has a disproportionately high low-income population, and the Project would have a positive impact on this population in terms of potential employment.
• May be minor impacts to quality of life, related to air and water quality, visual resources, traffic, and recreation to the Census Tract population.
Mitigation:
• No environmental justice effects were identified; therefore, no mitigation is warranted.</td><td>Construction:
• Similar to Alternative A, except quality of life environmental impacts would be reduced because there would be fewer turbines and a smaller Project footprint.</td><td>Construction:
• Similar to Alternative B, except quality of life environmental impacts would be further reduced because there would be greater space between the private lands and nearest turbines.</td><td>Construction:
No impacts.</td><td>Construction:
• Similar to Alternative B.</td></tr>
<tr><td></td><td>Operations and Maintenance:
• Job creation- and income-related effects would be of a more permanent nature given the 30-year life of the Project.
• The quality of life effects would be smaller in magnitude compared to during construction.
Mitigation:
• No environmental justice effects were identified; therefore, no mitigation is warranted.</td><td>Operations and Maintenance:
• Similar to Alternative A, except quality of life environmental impacts would be reduced because there would be fewer turbines.</td><td>Operations and Maintenance:
• Similar to Alternatives A and B, except quality of life environmental impacts would be further reduced because there would be greater space between the private lands and nearest turbines.</td><td>Operations and Maintenance:
No impacts.</td><td>Operations and Maintenance:
• Similar to Alternative B.</td></tr>
<tr><td></td><td>Decommissioning:
• Similar to Construction.
Mitigation:
• No environmental justice effects were identified; therefore, no mitigation is warranted.</td><td>Decommissioning:
• Similar to Alternative A, except quality of life environmental impacts would be reduced because there would be fewer turbines.</td><td>Decommissioning:
• Similar to Alternative B, except quality of life environmental impacts would be further reduced because there would be greater space between the private lands and nearest turbines.</td><td>Decommissioning:
No impacts.</td><td>Decommissioning:
• Similar to Alternative B.</td></tr>
</table>

<table>
<tr><th rowspan="2">Resource</th><th colspan="5">Possible Impacts</th></tr>
<tr><th>Alternative A</th><th>Alternative B</th><th>Alternative C</th><th>Alternative D – No Action</th><th>Alternative E – Agencies' Preferred Alternative</th></tr>
<tr><td rowspan="3">Visual Resources</td><td colspan="4">Information common to all alternatives:
Definitions:
Contrast:
None: The element contrast is not visible or perceived
Weak: The element can be seen but does not attract attention
Moderate: The element contrast begins to attract attention and begins to dominate the characteristic landscape
Strong: The element demands attention, will not be overlooked, and is dominant in the landscape</td><td></td></tr>
<tr><td colspan="3">Construction Impacts Common to all Action Alternatives:
• Temporary activities associated with construction (including equipment movement, and dust from earth moving and blasting) would be visible from most Key Observation Points (KOPs).
• Higher impacts would occur to KOPs situated closer to the Project, or higher in elevation than the proposed Project.
• The low visual sensitivity of viewers situated within Sensitivity Level Rating Unit (SLRU) 13 established during the pre-1990 VRI cannot be reduced, but localized changes in visual sensitivity may result from the proposed action.
• Members of the Hualapai Tribe with cultural ties to traditional locations within the Project Area may become more sensitive to the landscape changes.
• Residential viewers may become more sensitive to the landscape changes but over time may become less sensitive based on perceived loss of the natural setting of the landscape.
• Local visitors to Lake Mead who access the NRA via Squaw Peak Road could become accustomed to the turbines and ancillary facilities through repeated use of these roadways, and therefore become less sensitive to the change of the landscape.
• A localized reduction in visual sensitivity within SLRU 65 could result from the proposed Project. Residents in White Hills and Indian Peak Road area may become more sensitive to the landscape changes but over time become less sensitive based on perceived loss of the natural setting of the landscape.
• Motorists traveling through SLRU 65 are not expected to become more, or less, sensitive to landscape changes because this viewer group would experience a large portion of the SLRU that would not be affected by the Project.
• It is assumed that the majority of visitors to the Temple Bar area of Lake Mead would still select the paved access provided by Temple Bar Road. Common travel routes and viewpoints assumed to have been used in the pre-1990 VRI would, therefore, not change as a result of the proposed Project. Consequently no change in distance zones is expected.</td><td></td><td>Construction Impacts Common to All Action Alternatives:
• The same as Alternatives, A, B, and C.</td></tr>
<tr><td>Construction:
• The majority of activity would occur on and near the ground, and consequently would be shielded by topography. All construction-related impacts would be temporary and short-term.
Mitigation:
• Turbine arrays and turbine design shall be integrated with the surrounding landscape. Design elements to be addressed include visual uniformity, use of tubular towers, proportion and color of turbines, non-reflective paints, and prohibition of commercial messages on turbines.
• Other site design elements shall be integrated with the surrounding landscape. Elements to address include minimizing the profile of the ancillary structures, burial of cables, prohibition of commercial symbols, and lighting. Regarding lighting, efforts shall be made to minimize the need for and amount of lighting on ancillary structures.</td><td>Construction:
• In relation to Alternative A, impacts would be reduced in the northwest, northeast, and southern portions of the Project Area, which would primarily result from the decrease in viewer duration and increase in viewer distance to construction-related actions.</td><td>Construction:
• Same as Alternative B.</td><td>Construction:
No impacts.</td><td>Construction:
• Impacts would be similar to Alternative B, except impacts may be reduced in the northwest corner of the Project Area, which would primarily result from the decrease in viewer duration and increase in viewer distance to construction-related actions. If all phases are required, impacts could be greater than Alternative B in the south because of the potential for an additional turbine corridor near private property and residences.</td></tr>
<tr><td></td><td colspan="3">Operations and Maintenance Impacts Common to all Action Alternatives:
• Operation and maintenance of the proposed Project could include a general change in perception of the visual resources of the area over time.
• The configuration of turbine strings would create a sequence of vertical lines and the systematic repetition of structures would contrast the landscape to varying degrees depending on the angle of observation. Operation of turbines would introduce motion to an otherwise still environment, and the radiant color of turbine hazard lighting would create strong contrast against the darkness of existing night skies.
• Overall, the close proximity of turbines, and the motion associated with the blades would substantially change the character of the landscape when viewed from traditional locations identified by the Hualapai Tribe.
• Overall visual contrast observed during the day from US 93 is expected to be moderate, and blinking red hazard lights at night would result in strong visual contrast against the sky.
• Visual contrast observed during both day and night from private property areas of Indian Peak Drive and White Hills is expected to be strong.
• Strongest visual contrast would be observed from superior vantage points, such as KOP 169, or KOP 173. Project roads are expected to result in minor to moderate contrast when viewed from US 93 and the private property areas of White Hills and Indian Peak Road.
• The substation to be located at the northern terminus of the interconnect line would have a strong contrast to the softer lines of the surrounding landform and vegetation when viewed from Senator Mountain or Squaw Peak. Beyond 5 miles, visual contrast of the substation is expected to decline to weak.</td><td></td><td></td></tr>
</table>

Resource	Possible Impacts: Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Operations and Maintenance: • Direct impacts would result from the introduction of structures characterized by strong visual contrast against the existing landscape during both day and night from the majority of viewer areas analyzed. Strong visual contrast would be observed from traditional locations identified by the both the Hualapai Tribe, private property, and Temple Bar Road. Views from US 93 and Temple Bar Road are expected to be of short duration, and experienced at varying angles of observation. Impacts to views from the lake and adjacent uplands in the Lake Mead NRA would be greatest during nighttime conditions. Prolonged and/or stationary views of Project components from traditional locations identified by the Hualapai Tribe, private property, and campers situated on or adjacent to the NRA and visitors to wilderness and proposed wilderness areas would be most affected. • Indirect effects may result from changes in the level of viewer sensitivity over time due to reduction in scenic quality. Although operation and maintenance of the proposed Project is expected to result in a reduction of scenic quality and the viewers becoming less sensitive as they become accustomed to the change, the VRI class would remain a Class C. Operation of the proposed Project under Alternative A would be consistent with VRM Class IV objectives. **Mitigation:** • If approved by FAA, consider use of Audio Visual Warning System to activate obstruction lighting only when needed to warn an approaching aircraft.	**Operations and Maintenance:** • Visual contrast and affected views would be similar to Alternative A; however, direct and indirect effects to views from Temple Bar Road and the lake and adjacent uplands of the Lake Mead NRA would be reduced. The reduction of impacts to private property would be extremely localized and limited to the residence in the northern portion of the viewer area (Indian Peak Road). Although operation and maintenance of the proposed Project is expected to result in a reduction of scenic quality and the residences becoming less sensitive as they become accustomed to the change, the VRI class assigned to the area would remain a Class C. Operation of the proposed Project under Alternative B would be consistent with VRM Class IV objectives.	**Operations and Maintenance:** • Same as Alternative B.	**Operations and Maintenance:** No impacts.	**Operations and Maintenance:** • Impacts would be similar to Alternative B, except impacts may be reduced in the northwest, which would primarily result from the decrease in viewer duration and increase in viewer distance to operational turbines. • Commitment to use light gray turbines would reduce visual contrast when backdrop is natural terrain.
	Decommissioning: • Same as Construction impacts. • As decommissioning progresses, an incremental reduction in visual contrast from the facilities would occur. **Mitigation:** • None required.	**Decommissioning:** • Similar to Alternative A except there would be an incremental reduction in visual contrast because fewer turbines would be constructed and the project footprint is smaller.	**Decommissioning:** • Same as Alternative B.	**Decommissioning:** No impacts.	**Decommissioning**: • Similar to Alternative B.
Public Safety, Hazardous Materials, and Solid Waste	**Construction:** **Occupational Safety:** • Potential impacts to workers from most construction activities, though impacts would be minimized through adherence to Project Health and Safety Plan as well as to all requirements under the federal Occupational Safety and Health Act, the Arizona Division of Occupational Safety and Health, and other applicable laws and regulatory requirements. **Public Health and Safety:** • Risk of public accessing the Project Area and encountering highly disturbed (uneven) ground, open trenches, or motorized heavy equipment. • Oversized, slow-moving heavy vehicles hauling large parts may contribute to traffic accidents. • Short-term impacts from increased traffic, and associated reduced visibility caused by fugitive dust. **Hazardous Materials and Solid Waste:** • Potential of risk from possible exposure from lubricants, fuels, and combustion emissions and exposure to solid waste.	**Construction:** **Occupational Safety:** • Potential impacts to workers from construction activities, but reduced number of workers and/or exposure time because fewer turbines would be constructed than with Alternative A. **Public Health and Safety:** • Opportunity for accidents involving the public would be reduced compared to Alternative A because fewer turbines would be constructed. **Hazardous Materials and Solid Waste:** • Similar to Alternative A, but with reduced risk because fewer turbines would be installed and operated.	**Construction:** **Occupational Safety:** • Similar to Alternative B. **Public Health and Safety:** • Same as Alternative B. **Hazardous Materials and Solid Waste:** • Same as Alternative B.	**Construction:** Any impact would be related to current available access to the area and associated opportunity for illegal dumping or accidental petroleum product releases from vehicles.	**Construction:** **Occupational Safety:** • Similar to Alternative B. **Public Health and Safety:** • Same as Alternative B. **Hazardous Materials and Solid Waste:** • Similar to Alternative A, but with reduced risk because fewer turbines would be installed and operated.

Resource	Possible Impacts				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D – No Action**	**Alternative E – Agencies' Preferred Alternative**
	Mitigation: • Implement a site-specific SWPPP, Blasting Plan, Transportation and Traffic Plan, Dust and Emissions Control Plan, HSSE Plan, SPCC Plan, and Integrated Reclamation Plan. • Survey and flag areas to avoid disturbing areas beyond defined limits of disturbance. • Consult with local planning authorities regarding potential traffic issues. • Limit public access to Project Area during construction.				
	Operations and Maintenance: **Occupational Safety:** • Potential for accidental spills and worker accidents with risks associated with working at heights, high winds, and rotating/spinning systems, emergency maintenance procedures, inclement weather, and broken or failed mechanical components. **Public Health and Safety:** • Possible (but rare) risk of a rotor blade breaking and parts being thrown off the turbine. • Potential for accidental impacts between small aircraft and wind turbines is slight. • Electrical shorts, insufficient equipment maintenance, or contact with power lines could ignite dry vegetation and contribute to risk of fire. **Hazardous Materials and Solid Waste:** • Potential of risk from possible exposure from lubricants, fuels, and combustion emissions and exposure to solid waste. **Mitigation:** • Additional plans should be prepared including a site-specific SWPPP, Blasting Plan, Transportation and Traffic Management Plan, HSSE Plan, SPCC Plan, Dust and Emissions Control Plan, and Integrated Reclamation Plan. These plans would include elements that contribute to a maintaining a safe environment and/or minimizing the potential for adverse health effects associated with dust or pollutants in water, and other safety and operations plans as needed. • Local planning authorities would be consulted regarding increased traffic issues during construction and decommissioning. • The Project would comply with FAA regulations, including use of lighting requirements to warn aviators of obstructions (FAA 2007). • A fire management and response strategy to minimize the potential for a fire and to promptly extinguish fires would be developed. • .	**Operations and Maintenance:** **Occupational Safety:** • Opportunity for worker accidents reduced because fewer turbines would be constructed; other risks would be similar to Alternative A. **Public Health and Safety:** • Risks would be similar, but reduced from Alternative A by the reduction in the number of turbines and the size of the Project footprint. **Hazardous Materials and Solid Waste:** • Similar to Alternative A, but with reduced risk because fewer turbines would be installed and operated.	**Operations and Maintenance:** **Occupational Safety:** • Same as Alternative B. **Public Health and Safety:** • Same as Alternative B. **Hazardous Materials and Solid Waste:** • Same as Alternative B.	**Operations and Maintenance:** No impacts.	**Operations and Maintenance:** **Occupational Safety:** • Same as Alternative B. **Public Health and Safety:** • Same as Alternative B. **Hazardous Materials and Solid Waste:** • Same as Alternative B.

Resource	Possible Impacts				
	Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Decommissioning: **Occupational Safety:** • Similar to Construction, except no blasting is planned during decommission. **Public Health and Safety:** • Similar to Construction. **Hazardous Materials and Solid Waste:** • Potential of risk from possible exposure from lubricants, fuels, and combustion emissions and exposure to solid waste. **Mitigation:** • Same as Construction.	**Decommissioning:** **Occupational Safety:** • Risk would be similar to Alternative A because the activities would be the same, although there would be fewer turbines to remove. **Public Health and Safety:** • Similar to Alternative A. **Hazardous Materials and Solid Waste:** • Similar to Alternative A, but with reduced risk because fewer turbines would be installed and operated.	**Decommissioning:** **Occupational Safety:** • Same as Alternative B. **Public Health and Safety:** • Same as Alternative B. **Hazardous Materials and Solid Waste:** • Same as Alternative B.	**Decommissioning:** No impacts.	**Decommissioning:** **Occupational Safety:** • Same as Alternative B. **Public Health and Safety:** • Same as Alternative B. **Hazardous Materials and Solid Waste:** • Same as Alternative B.
Microwave, Radar, and other Communications	**All impacts would be related to Operations**: **Microwave**: • No impacts; no interference with identified microwave beam paths has been identified. **Radar/Air Traffic**: • Based on preliminary screening, the Project Area is classified as "green" and is not likely to cause an impact with National Air Defense and Homeland Security Radars, weather radars, or Military Operations. • Possible hazard to navigable airspace due to height of turbines (over 200 feet); an aeronautical study in accordance with FAA Regulations Part 77 resulted in a No Hazard Determination if the turbines conform to FAA paint schemes and have synchronized warning lights at night. **Mitigation:** • Relocate or eliminate wind turbines, as necessary, to avoid existing microwave signals that are near the Project site.	**Operations and Maintenance:** **Microwave:** • Same as Alternative A. **Radar/Air Traffic:** • Same as Alternative A.	**Operations and Maintenance:** **Microwave:** • Same as Alternative A. **Radar/Air Traffic:** • Same as Alternative A.	**Operations and Maintenance:** No impacts.	**Operations and Maintenance:** **Microwave:** • Same as Alternative A. **Radar/Air Traffic:** • Same as Alternative A.
Noise	**Construction**: • Impacts experienced during the night are assumed to be 4 dBA less than daytime noise emissions and would be temporary in nature. • Representative noise monitoring location LT2, on the boundary of a planned residential development area east of the Wind Farm Site, would be expected to experience sound exceeding 45 dBA by more than 2 dBA during the day. • Representative location LT3, a planned residential development east of the Wind Farm Site, would be expected to experience noise from 20 to 24 dBA. • Other representative locations would be expected to experience noise from 33 to 47 dBA. • If blasting were required for the turbine foundation nearest to LT2 (a distance of approximately 2,000 feet from the noise monitoring location on the boundaries of planned residential development areas near the Wind Farm Site), the predicted blast noise level would be 30 dBA Leq and thus considerably lower than the guidance level of 45 dBA Leq.	**Construction**: • Construction noise impacts would be similar to Alternative A. • Representative location LT2 expected to experience sound exceeding 45 dBA by more than 2 dBA during the day. • The two representative locations at Lake Mead NRA would experience less than 20 dBA. • .	**Construction**: • Same as Alternative B.	**Construction**: No impacts.	**Construction**: • Noise effects on Lake Mead NRA would be comparable to those described for Alternative B except that the turbines that could be constructed in Township 29 North, Range 20 West, Section 2 would be expected to result in occasional Project operational noise levels of 35 dBA when wind speeds from the south are at or exceed 12 m/s (about 27 mph). • Noise effects on private property would be similar to Alternative A if the southern turbine corridor were built to meet the required nameplate capacity, but similar to Alternative B if construction of the southern turbine corridor was not required.

Resource	Possible Impacts Alternative A	Alternative B	Alternative C	Alternative D – No Action	Alternative E – Agencies' Preferred Alternative
	Mitigation: • Ensure noise producing equipment complies with local, state, or Federal agency regulations. • Employ noise producing signals for safety warning purposes only. • Ensure public address, loudspeaker, amplified music systems, etc., comply with local noise regulations, or do not exceed noise limits imposed on wind farms, whichever is the lowest level of acceptable noise. • Establish a hotline for noise complaints and a system to address complaints.				

	Operations:
	• All five representative noise monitoring locations expected to experience noise levels of less than 45 dBA.
	• Sound levels for the two representative locations at Lake Mead NRA would be expected to experience less than 35 dBA, except when winds are blowing from south-to-north at 12 meters/second (m/s or about 27 miles/hour).
	• The locations with the highest dBA levels from the modeled Scenarios include:
	  ○ LT3 to experience noise greater than 45 dBA, but less than 50 dBA during wind occurrences of 12 m/s headed south.
	  ○ LT3 to experience noise greater than 45 dBA, but less than 50 dBA.
	  ○ Two areas along the southern border where Lake Mead NRA abuts the Project Area expected to experience noise ranging from 35 to 40 dBA during wind occurrences of 12 m/s headed north.
	Mitigation:
	• Equip vehicles with internal combustion engines with mufflers, air-inlet silencers, and noise reducing features that meet or exceed original factory specification.
		Operations and Maintenance:
		• All five representative noise monitoring locations are expected to experience less than 45 dBA.
		• No planned or actual residential-use land is expected to be exposed to Project operational noise levels greater than 45 dBA L_{eq}, and no Lake Mead NRA land is expected to be exposed to Project operation noise levels greater than 35 dBA L_{eq}.
			Operations and Maintenance:
			• Similar to Alternative B, but setback from some private property would be a greater distance, further minimizing the potential for residents to hear operational turbine noise.
				Operations and Maintenance:
				No impacts.
					Operations and Maintenance:
					Similar to Alternative B, would be expected to result in occasional Project operational noise levels of 35 dBA when wind speeds from the south are at or exceed 12 m/s (about 27 mph) and the affected area would be limited to about 100 acres or less.

	Decommissioning: • Similar to Construction, except no blasting is planned for decommission. **Mitigation**: • Similar to Construction.	**Decommissioning**: • Similar to Construction, except no blasting is planned during decommissioning.	**Decommissioning**: • Same as Alternative B.	**Decommissioning:** No impacts.	**Decommissioning**: • Same as Alternative B.

1.0 INTRODUCTION, PURPOSE AND NEED

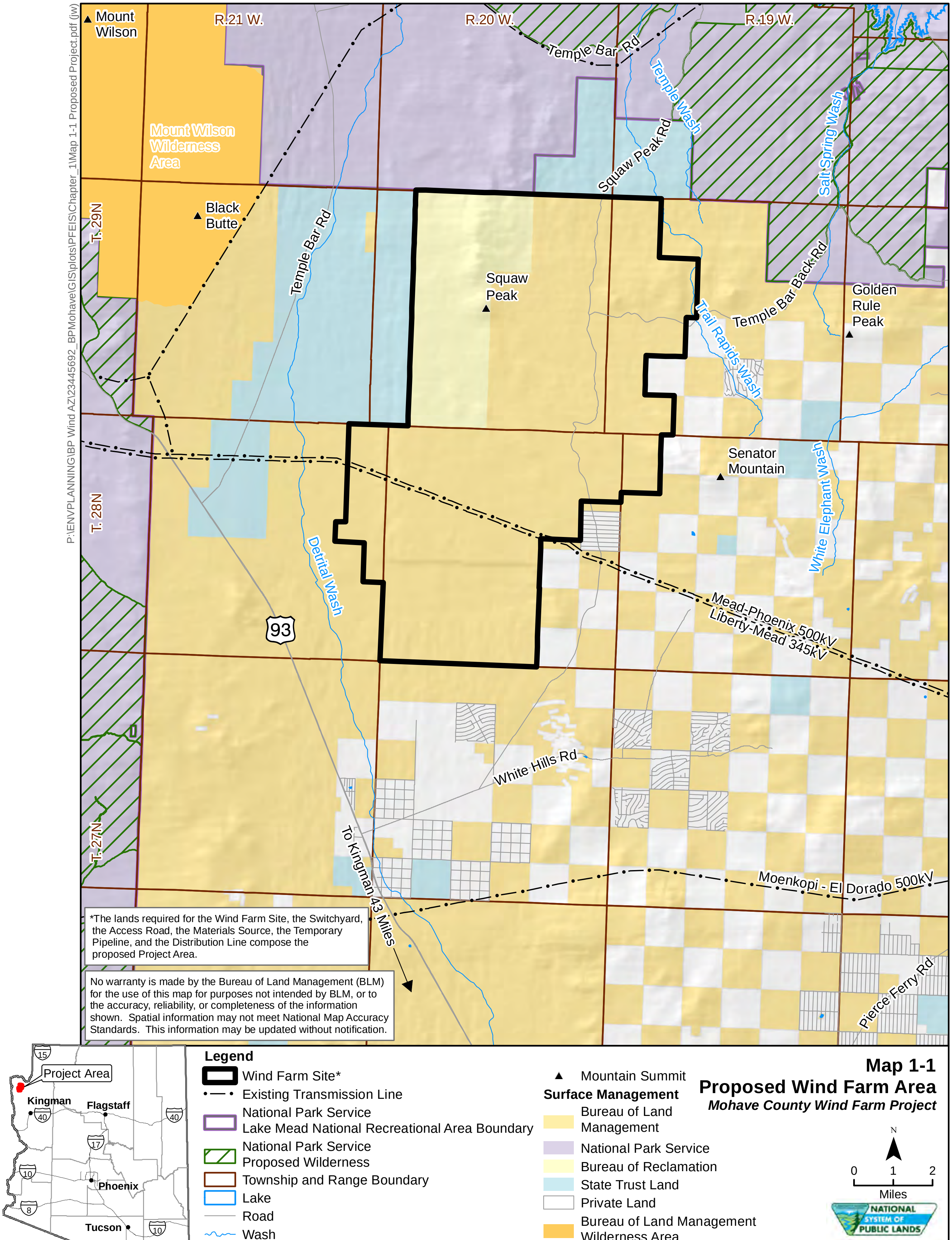
1.1 PROJECT INTRODUCTION AND LOCATION

BP Wind Energy North America Inc. (BP Wind Energy) is proposing to construct, operate, maintain, and eventually decommission a wind-powered electrical generation facility in Mohave County, Arizona. The proposed action, the Mohave County Wind Farm Project (Project), would be built in the White Hills of Mohave County about 40 miles northwest of Kingman, Arizona, and just south of Lake Mead National Recreation Area (Map 1-1). The Project includes the following major components and facilities:

1) a wind farm (the Wind Farm Site) on approximately 38,099 acres of public land managed by the Bureau of Land Management (BLM) Kingman Field Office (KFO), and approximately 8,960 acres of Federal land managed by the Bureau of Reclamation (Reclamation). Project features within the Wind Farm Site would include, but not be limited to, turbines aligned within corridors, access roads, an operations and maintenance building (potentially with a water well to support the operations and maintenance building), two temporary laydown/staging areas (with temporary batch plant[1] operations), temporary and permanent meteorological (met) towers, two substations, and collector lines.
2) up to 10 acres of BLM-administered public lands within the Wind Farm Site would be used for construction of the switchyard[2] (the Switchyard) that would be operated by the Western Area Power Administration (Western);
3) an approximately 3-mile access road between the Wind Farm Site and U.S. Highway 93 (US 93) (the Access Road);
4) the temporary use of the existing Detrital Wash Materials Pit as a materials source (the Materials Source) for the base material of roads and for concrete needed for foundations. The existing water wells in the immediate vicinity of this Materials Source and the well to be established for potable water at the operations and maintenance building would provide water during construction for batch plant operations and dust suppression;
5) a water pipeline (the Temporary Pipeline) that would extend within the primary Access Road right-of-way (ROW) from the Materials Source to the main laydown/staging area where batch plant operations are proposed to occur; and
6) a distribution line (the Distribution Line) that would be expected to tap into an existing power line south of the Project Area, parallel US 93 north to the Access Road, and follow the access road to the main (southernmost) laydown/staging area where batch plant operations are proposed to occur.
7) if the 345-kilovolt (kV) interconnection option is selected, an existing 345/230-kV transformer and associated breakers and switches within Western's Mead Substation would be replaced with two new 600 megavolt-ampere (MVA) 345/230-kV transformers and new breakers and switches. These replacements, which would be required to accommodate the increased electrical loading related to generation from the proposed Project, would be accomplished by Western at BP Wind Energy's expense. The existing transformer is at the terminus of the Liberty-Mead 345-kV line in Mead Substation; the substation is located near Boulder City, Nevada.

[1] A manufacturing plant where concrete is mixed and made ready to be poured before being transported to a construction site.

[2] A facility where electricity from the electrical generator is transferred to the electric grid.



Source:
Base Map: ALRIS 2007-2008, BLM 2009, NHD 2008 Project Area Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

The public lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area. BP Wind Energy has filed applications for ROWs with BLM and Reclamation to develop the Wind Farm Site, the Access Road, and the Temporary Pipeline on these public lands, and Western has applied for a ROW for the Switchyard. The Distribution Line ROW application would be filed by the owner of the line, Unisource Energy. A contract for the sale of mineral materials would be issued if BP Wind Energy is the successful bidder for the Materials Source.

The Project would generate and deliver electrical power to the regional electrical transmission grid by interconnecting with an existing transmission line passing through the Project Area. The potential interconnection points include the Liberty-Mead 345-kV or Mead-Phoenix 500-kV transmission lines, both of which cross the southern portion of the Wind Farm Site. BP Wind Energy has filed applications to interconnect the Project with one of these two transmission lines.

Up to 283 turbines[3] are proposed to be installed within the corridors on the Wind Farm Site; each would have the capability to generate up to nameplate capacity of between 1.5 megawatts (MW) to 3.0 MW per turbine. Depending on the turbine model used, the turbine hubs would be between 262 feet (80 meters) and 345 feet (105 meters) above the ground, and the turbine blades would extend between 126 feet (38.5 meters) and 194 feet (59 meters) above the hub. At the top of their arc, the blades would be between 390 feet (118.5 meters) and 539 feet (164 meters) above the ground. The energy generating capacity of the Project would depend on the turbine model selected, the transmission line used, and the turbine corridors approved by BLM and Reclamation. The Project would have a nameplate generating capacity[4] of 425 MW in the event the Project interconnects to the Liberty-Mead line, and 500 MW in the event the Project interconnects to the Mead-Phoenix line. The desired generation level could be achieved by different numbers of turbines, depending on the turbine model(s) selected by BP Wind Energy, and the land area approved by BLM and/or Reclamation in accordance with the decisions made by these agencies in their respective Records of Decision (RODs).

This Environmental Impact Statement (EIS) is being prepared in compliance with the National Environmental Policy Act of 1969 (NEPA) in order to analyze and disclose the probable effects of the Project. The BLM is the lead agency responsible for preparing this EIS. Other agencies (Federal, state, and local) cooperating with BLM in the preparation of the EIS include Reclamation, Western, National Park Service (NPS), Arizona Game and Fish Department (AGFD), and Mohave County. The Hualapai Tribe, a governmental entity, is also cooperating with BLM in the preparation of the EIS.

The Federal agency decisions regarding the Project components and facilities are interdependent; in addition to BLM, Reclamation has jurisdiction for a portion of the proposed Wind Farm Site and Western has jurisdiction for the interconnection request. Therefore, based on the analysis in this EIS, three RODs may be issued, although BLM and Reclamation have elected to issue a joint ROD:

- BLM's and Reclamation's jointly issued ROD would approve, deny, or approve as modified ROWs to BP Wind Energy for development of the Wind Farm Site and any associated facilities (e.g., the Access Road, the Materials Source, and the Temporary Pipeline) located outside the Wind Farm Site on BLM-administered public lands and Reclamation-administered Federal lands.

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[3] Turbine is the term used to describe the complete assembly of pieces that include the rotor blades, hub, nacelle, and support tower.

[4] Nameplate generation capacity is equivalent to the sum of all installed wind turbine generators at their maximum output capacity.

The ROD would also address a separate ROW for the Switchyard and a separate ROW to UniSource Energy for the Distribution Line.

- Western's ROD would approve, deny, or approve as modified the interconnection request if the Project interconnects with one of the existing transmission lines (the Liberty-Mead 345-kV or Mead-Phoenix 500-kV transmission line) through the Switchyard. If the 500-kV interconnection request is approved, Western would construct, operate, and maintain the Switchyard in support of the proposed Project. If the 345-kV interconnection is selected, Western would construct, own, operate, and maintain the Switchyard and Western's ROD would also approve the replacement of the 345/230-kV transformer at Mead Substation with two new 600-MVA 345/230-kV transformers and associated equipment such as breakers and switches.

1.2 BACKGROUND

A number of Federal regulations, policies, and plans have been developed to guide wind energy development on BLM- and Reclamation-administered public/Federal lands. They include (1) enactment of the Energy Policy Act of 2005 (EPAct) (Public Law 109-58), (2) development of the *Final Programmatic Environmental Impact Statement for Wind Energy Development on BLM-Administered Lands in the Western United States* (PEIS) (BLM 2005a), and (3) Secretarial Order 3285A1 – *Renewable Energy Development by the Department of the Interior*, dated March 11, 2009, as amended February 22, 2010. In addition, pertinent BLM Instruction Memoranda (IMs) include (1) *Wind Energy Development Policy, IM No. 2009-043* (BLM 2008a), (2) *National Environmental Policy Act Compliance for Utility-Scale Renewable Energy Right-of-Way Authorizations, IM No. 2011-059* (BLM 2011a), (3) *Solar and Wind Energy Applications – Due Diligence, IM 2011-060* (BLM 2011b), and (4) *Solar and Wind Energy Applications – Pre-Application and Screening, IM 2011-061* (BLM 2011c). BLM and Reclamation (where appropriate for Reclamation) will refer to this guidance as each agency considers BP Wind Energy's applications for ROWs to develop the Project.

1.2.1 National and State Renewable Energy Requirements

In 2001, the President established the National Energy Policy Group to develop a national energy policy. A recommendation from the Policy Group was for the Departments of the Interior, Energy, Agriculture, and Defense to work together to increase access across public lands to accommodate the demand for additional energy and electricity nationwide (National Energy Policy Development Group 2001). In 2005, Congress established a goal to have at least 10,000 MW of renewable energy projects approved on public lands by 2015 under the EPAct (Public Law 109-58 § 211). Additionally, a majority of the western states have adopted Renewable Portfolio Standards, under which a proportion of the electricity provided by utilities must come from renewable energy sources, including wind and solar resources. For example, in Arizona, the Arizona Corporation Commission established a Renewable Portfolio Standard requiring that, by 2025, utilities in Arizona generate 15 percent of their energy from renewable sources. Similarly, the Renewable Portfolio Standard for Nevada requires 20 percent renewable energy by 2015 and California requires 33 percent renewable energy by 2030 (Department of Energy [DOE] 2010). BP Wind Energy's proposed action would help meet these national and state objectives to increase renewable energy production.

In 2012, as part of their work on environmentally responsible development of utility-scale renewable energy projects on public lands, BLM gave priority status to 17 renewable energy projects (nine solar, six wind, and two geothermal) representing about 7,000 MW. BLM developed this priority list in collaboration with the Bureau of Indian Affairs, the U.S. Fish and Wildlife Service (USFWS) and the NPS, with an emphasis on early consultation. The 2012 priority projects were selected based on a variety of criteria, including progress of the necessary public participation and environmental analysis under NEPA and applicable state environmental laws (BLM 2012). These projects, which include the Mohave

County Wind Farm Project along with six other renewable energy projects, are also included in the August 2012 *We Can't Wait* initiative (Office of the Press Secretary 2012).

1.2.2 BLM Wind Energy Policies and Requirements

In response to the 2001 National Energy Policy, the BLM Washington Office established an interim national Wind Energy Development Policy to implement recommendations to increase renewable energy production using BLM-administered public lands. BLM then prepared the *Wind Energy Development PEIS* (BLM 2005) to evaluate the Wind Energy Development Policy and issues associated with future wind energy development on BLM-administered lands in the West. The ROD for the PEIS was signed on December 15, 2005, and established policies and Best Management Practices (BMPs) for wind energy ROW authorizations (refer to Sections 5.1 through 5.14 of the PEIS for a list of the BMPs). BLM issued IM-2009-043 in 2008 (BLM 2008a) to further clarify wind energy development policies and BMPs from the 2005 ROD and to provide updated guidance on processing ROW applications for BLM-administered public lands. The BLM issued IM-2011-059, IM-2011-060, and IM-2011-061 in 2011 to further clarify renewable energy ROW authorizations and application processes (BLM 2011(a)(b)(c)). IM 2011-060 and IM 2011-061 updated IM-2009-043. The BLM has followed the guidance set forth and incorporated information and analysis from the Wind Energy PEIS, the 2005 ROD, and applicable IMs to effectively evaluate and assess the proposed Project in this EIS.

Furthermore, BLM is responsible for reviewing and processing applications for ROWs on public lands in accordance with the Federal Land Policy and Management Act (FLPMA). BLM is authorized to issue ROWs for "systems for generation, transmission, and distribution of energy…" per FLPMA 43 United States Code (U.S.C.) § 1761(a)(4). A ROW grant is a Federal action that requires the completion of environmental reviews pursuant to NEPA.

1.2.3 Applicant

The proposed action would be developed by BP Wind Energy North America Inc., a wholly owned indirect subsidiary of BP p.l.c., a publicly traded company, or an affiliate thereof. BP Wind Energy, successor-in-interest to Orion Energy L.L.C. as developer of the Project and applicant hereunder, which is currently a wholly-owned subsidiary of BP Wind Energy, is a principal owner and operator of wind power facilities in the United States with interests in 13 wind farms in seven states. As of October 2012, BP Wind Energy has a gross installed capacity of nearly 2,000 MW, enough electricity to power approximately 600,000 average American homes, and has 645 MW in construction and more than 2,000 MW of projects in an advanced stage of development. A standard BLM administrative process was used to change the holder of the application from Orion Energy L.L.C. to BP Wind Energy in September 2009. As part of its development portfolio, BP Wind Energy has applied to generate up to a maximum nameplate capacity of 500 MW at the Project and has filed interconnection requests with Western that commit the firm to certain generating capacities (dependent on the specific transmission line) if the Project is approved.

1.2.3.1 Application for Rights-of-Way Including Wind Studies and Meteorological Towers

The Project Area has been established through a series of BLM and Reclamation ROW grants for wind energy testing and monitoring, and applications for development ROW grants, as shown in Table 1-1.

Table 1-1 Right-of-Way Application History

ROW Grant Case File Number	Purpose	Date	Comments (where applicable)
AZA-32315	Authorize the construction of two meteorological towers (met towers)	October 2003	
AZA-32655	Expand the study area and construct an additional met tower	April 2004	Met tower was never installed.
AZA-33628	Renew ROW grant AZA-32315	December 2006	As a condition of the renewal, BLM required a ROW application and Plan of Development for a long-term ROW grant for the wind energy development project.
AZA-32315	(1) Renew existing ROWs, (2) authorize approximately 18,000 additional acres for wind energy testing and monitoring (3) authorize the construction of six additional met towers, and (4) consolidate all ROW case numbers under a single file	June-July 2007	
AZA-32315	(1) Amend ROW grant AZA-32315 to modify the boundaries of the Wind Farm Site to exclude certain public lands administered by BLM and to include lands that may be needed for a transmission line, (2) relocate met towers, (3) place a temporary sonic detection and ranging system (SODAR) on public land, and (4)conduct geotechnical investigations through boring samples	April 2010	
AZA-32315	(1) expand the development area of the Wind Farm Site by approximately 10,880 acres, and (2) install three temporary met towers on this land	April 2011	
Contract # 00-07-30-L0746	(1) Geotechnical Boring (2) Temporary meteorological tower installation	October 2011	Reclamation issued this contract after BP Wind Energy filed an application with Reclamation to develop part of the proposed wind farm on Federal land administered by Reclamation.

In accordance with BLM IM-2009-043, *Wind Energy Development Policy*, a Categorical Exclusion may be used to provide the environmental clearance for the issuance of short-term ROW authorizations, such as site testing and monitoring activities or sites. Therefore, applications to establish met towers, establish sonic detection and ranging system (SODAR) sites, and collect geotechnical boring samples were evaluated through preparation of Categorical Exclusion documents because the ROWs would be short-term actions (three years or less), would require minimal land, be temporary, and no significant impacts were identified. Reclamation also used a Categorical Exclusion for issuance of Contract # 00-07-30-L0746, referenced in Table 1-1. The proposals identified in Table 1-1 were also in conformance with the Kingman Resource Management Plan, and included rehabilitation to restore the sites to their original condition. In accordance with IM-2009-043, the term of a site-specific ROW grant is limited to three years from the date of issuance and a new ROW application must be submitted if the holder of the site-specific ROW grant wishes to continue monitoring at the site; when applicable, ROW grants have been renewed. As indicated in Table 1-1, wind resource studies for the Project were initiated in 2003 and several met towers have been installed since those initial studies to better understand the wind resources in the area. Equipment on the towers measure wind speed, wind variation by elevation, wind shear, and seasonal wind changes; the met towers are also equipped with pulleys, which provide the mechanism needed to suspend bat or bird monitoring equipment in the rotor sweep area. The 13 total met towers and SODAR units continue to collect data and operate within BP Wind Energy's ROW application area. Current data indicate that this area is suitable for wind turbine applications and has sufficient wind to produce energy for a commercial facility.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION AND RELATED AGENCY ACTIONS

Overall, the purpose for federal action by the BLM, Reclamation, and Western is to respond to BP Wind Energy's Proposal to use Federal lands. In accordance with Section 1702(c) of FLPMA, public lands administered by the BLM are to be managed for multiple-use that takes into account the long-term needs of future generations for renewable and non-renewable resources. The Secretary of the Interior is authorized to grant rights-of-way on public lands for systems of generation, transmission, and distribution of electric energy (43 U.S.C. § 501(a)(4)). Taking into account the BLM's multiple-use mandate, the purpose and need for the proposed action is to respond to a FLPMA right-of-way application submitted by BP Wind Energy to construct, operate, maintain, and decommission a wind energy facility and associated infrastructure in compliance with FLPMA, BLM right-of-way regulations, and other applicable Federal laws and policies.

The need for the proposed action is to respond to the projected demand for renewable energy and assist Arizona (or other western states) with meeting established Renewable Energy Portfolio Standards. This proposed action, if approved, would assist the BLM in addressing the management objectives in the EPAct (Title II, Section 211), which establish a goal for the Secretary of the Interior to approve 10,000 MW of electricity from non-hydropower renewable energy projects located on public lands. This proposed action, if approved, would also further Secretarial Order 3285A1 (March 11, 2009) that establishes the development of environmentally responsible renewable energy as a priority for the Department of the Interior.

1.3.1 <u>Decisions to be Made</u>

BLM has prepared this EIS to evaluate and analyze environmental impacts associated with the proposed action. Decisions from BLM and other agencies at the Federal, state, and local level will be required. Public input will be considered in the decision-making process. The agencies below each have a responsibility to respond to and make a decision regarding the proposed action and reasonable alternatives.

1.3.1.1 BLM

The BLM will consider the use of BLM-administered public lands in the White Hills area of Mohave County, Arizona, to help meet the need for energy, particularly from renewable wind energy sources, consistent with the EPAct and BLM's Wind Energy Development Policy, including BLM's 2011 Instruction Memoranda on processing renewable energy ROW applications. Responding to requests for ROWs on BLM-administered public lands is required of BLM under FLPMA.

The BLM will decide whether or not to grant the ROWs for the construction, operation, maintenance, and decommissioning of the proposed Wind Farm Site, or grant the ROW with modifications such as changing the route or location of the proposed facilities (43 Code of Federal Regulations [CFR] 2805.10(a) (1)). Should BLM approve the ROW for the Wind Farm Site, BLM would also consider whether to deny, grant, or grant with modification, ROWs for the proposed ancillary facilities or access on BLM-administered public lands, including a ROW for the switchyard, a ROW to UniSource Energy for a distribution line to provide power during construction, and a contract for the sale of mineral materials. BLM will decide which alternative to select, any mitigation required, and the terms and conditions that will be included in the ROW grants. This decision would be outlined in a ROD, based on the analysis in the EIS, including consideration of public input.

1.3.1.2 Reclamation

Reclamation will consider the use of Reclamation-administered lands in the White Hills area of Mohave County, Arizona, to help meet the need for renewable energy, consistent with the EPAct. It is Reclamation's responsibility under the Act of Congress of June 17, 1902 (32 Stat. 388), the Act of Congress approved August 4, 1939 (53 Stat. 1187), Section 10, and 43 CFR Part 429 to respond to a request for ROWs on Reclamation-administered Federal lands.

Reclamation will decide whether or not to grant the ROWs for the construction, operation, maintenance, and decommissioning of the proposed action and any associated access on Reclamation-administered lands. If Reclamation's decision is to grant the ROWs, the decision, terms and conditions, and any mitigation measures would be outlined in a ROD, based on the analysis and conclusions in the EIS, including consideration of public input. The mitigation measures and terms and conditions would be included in the ROW grants.

1.3.1.3 Western

BP Wind Energy has applied to interconnect the proposed Project with either the Mead-Phoenix (of which Western is one of several co-owners[5]) or Western's Liberty-Mead transmission line. In either case, the proposed Project would interconnect through a new switchyard to be constructed within the Wind Farm Site. Western's purpose and need is to consider and respond to BP Wind Energy's interconnection request in accordance with its Open Access Transmission Service Tariff (Tariff) and the Federal Power Act. Western's Tariff is filed with the Federal Energy Regulatory Commission (FERC).

1.3.2 Agency Authority and Actions

Table 1-2 lists the potential major Federal, state, and county actions and authorities that must be obtained or considered for the proposed action. Approvals required by the State of Arizona and Mohave County also are described, as applicable, for each resource addressed in Chapter 3 (Affected Environment) of this EIS.

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[5] The participants (owners) in the Mead-Phoenix line include: Arizona Public Service Company, 18 percent; MSR Public Power Agency, 12 percent; Southern California Public Power Authority, 18 percent; Startrans IO, LLC, 2 percent; Salt River Project Agricultural Improvement and Power District (SRP), 18 percent; and Western, 32 percent. SRP would process the interconnection request to the Mead-Phoenix transmission line under interconnection procedures agreed to by the participants/owners.

Table 1-2 Summary of Potential Major Agency Authorities and Actions

Agency	Proposal Requiring Action	Permit, License, Approval, Compliance, or Review	Relevant Law and/or Regulation
FEDERAL			
Bureau of Land Management (BLM), Bureau of Reclamation (Reclamation)	Right-of-way grants for the Wind Farm Site, primary access road, transmission line, and other associated facilities on BLM and Reclamation land. The BLM is the lead agency for National Environmental Policy Act (NEPA) purposes.	EIS and Record of Decision	NEPA (42 United States Code [U.S.C.] 4321); Council Environmental Quality NEPA Regulations (40 CFR 1500-1508) Department of the Interior implementing regulations (43 CFR 46)
BLM (lead) and Reclamation in coordination/cooperation with U.S. Fish and Wildlife Service (USFWS)	Construction, operation, maintenance, and decommissioning of facilities for the Wind Farm Site, primary access road, and other associated facilities on public land	Right-of-way grant across public land; temporary use permit; contract for sale of mineral materials	Federal Land Policy and Management Act (FLPMA) of 1976 (PL 94-579); 43 U.S.C. 1761-1771; 43 CFR 2800; 43 CFR 3602
BLM (lead) and Reclamation in coordination/cooperation with USFWS	Right-of-way grant to Western for the switchyard	Right-of-way grant	FLPMA of 1976 (PL 94-579); 43 U.S.C. 1761-1771; 43 CFR 2800
BLM (lead) and Reclamation in consultation with Arizona State Historic Preservation Officer (SHPO), Western Area Power Administration (Western), Advisory Council on Historic Preservation	Proposed undertaking that may adversely affect properties eligible for the National Register of Historic Places	Section 106 reviews and provides consultations to identify and resolve any adverse effects to historic properties	National Historic Preservation Act of 1966, (16 U.S.C. 470) (36 CFR 800)
BLM (lead), Reclamation	Investigation of cultural and paleontological resources; excavation of archaeological resources	Permit to collect artifacts and to excavate archaeological sites	Antiquities Act of 1906 (16 U.S.C. 432-433) and Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa to 470ee); Paleontological Resources Preservation Act of 2009 (16 U.S.C. 470aaa)
BLM (lead), Reclamation	Potential conflicts with freedom to practice traditional American Indian religions	Consultation with affected American Indian tribal entities	American Indian Religious Freedom Act (42 U.S.C. 1996); EO 13007, Indian Sacred Sites; and EO 13175, Consultation and Coordination with Indian Tribal Governments

Table 1-2 Summary of Potential Major Agency Authorities and Actions

Agency	Proposal Requiring Action	Permit, License, Approval, Compliance, or Review	Relevant Law and/or Regulation
BLM (lead), Reclamation	Potential disturbance of graves, associated funerary objects, sacred objects, and items of cultural patrimony	Consultation with affected groups regarding a Plan of Action for treatment of protected remains and objects	Native American Graves Protection and Repatriation Act of 1990 (25 SUC 3001-3002)
BLM	Prevent the establishment and spread of noxious and invasive weeds	Compliance	Federal Noxious Weed Act of 1974, as amended, Public Law 93-629 (7 U.S.C. § 2801 et seq.; 88 Stat. 2148); and EO 13112, Invasive Species
BLM and Reclamation in consultation with USFWS	Effects on species listed or critical habitat designated under the ESA, and BLM sensitive species	Compliance	Endangered Species Act of 1973, as amended (16 U.S.C. §1531) Section 7(a)(2); and BLM Manual H-6840 (Special Status Species)
BLM and Reclamation in consultation with USFWS	Protection of migratory birds	Compliance	The Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712; Ch. 128); and EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds
BLM and Reclamation in consultation with USFWS	Protection of Bald and Golden Eagles	Compliance	The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), 1940 et seq., and BLM Instruction Memorandum 2010-156.
BLM	Protection of segments, sites, and features related to national trails	Compliance	National Trails System Act (PL 90-543) (16 U.S.C. 1241 to 1249)
Reclamation	Preconstruction surveys, con-struction, operation, maintenance, and decommissioning of facilities on Reclamation withdrawn land	Right-of-way grant across Reclamation withdrawn land; temporary use permit	Act of Congress of June 17, 1902 (32 Stat. 388) Act of Congress approved August 4, 1939 (53 Stat. 1187) Section10, and 43 CFR 429
Western	Transmission line interconnection request	Interconnection approval	Section 211 of the Federal Power Act (18 CFR § 2.20); Western's Open Access Transmission Service Tariff; Department of Energy NEPA implementing regulations (10 CFR 1021)
U.S. Environmental Protection Agency	Potential Pollutant discharge during construction, operation, maintenance, and decommissioning	Spill Prevention Control and Countermeasure (SPCC) Plan	Oil Pollution Act of 1990 (33 U.S.C. 2701 et seq.; 40 CFR Part 112)

Table 1-2 Summary of Potential Major Agency Authorities and Actions

Agency	Proposal Requiring Action	Permit, License, Approval, Compliance, or Review	Relevant Law and/or Regulation
U.S. Army Corps of Engineers (USACE)	Potential discharge of dredged or fill material into waters of the United States (including wetlands and washes)	Section 404 Permit (individual or nationwide)	Clean Water Act (33 U.S.C. 1344)
Federal Aviation Administration (FAA)	Structures exceeding 200 feet	Determination of No Hazard To Air Navigation	14 CFR Part 77, Objects Affecting Navigable Air Space (49 U.S.C. 44718)
FAA	Structures exceeding 200 feet	Confirmation of achieved height	14 CFR Part 77, Objects Affecting Navigable Air Space (49 U.S.C. 44718)
FAA	Required lighting on turbines	Review and approval of selective lighting	FAA Advisory Circular 70/7460-1K, change 2
STATE			
Arizona Corporation Commission	Construction of transmission line of 115 kV or more	Certificate of Environmental Compatibility	Arizona Revised Statute (ARS) Section 40-320 et seq.
Arizona Department of Environmental Quality (ADEQ) for submittal to USACE	Reviews activities and provides conditions for protecting water quality for inclusion in the Section 404 Permit	Section 401 Certification	Clean Water Act (33 U.S.C. 1344)
ADEQ	Air pollutant emissions during construction	Class II (minor source) permit	Clean Air Act, Arizona Administrative Code (AAC) Title 18, Chapter 2, Article 3
ADEQ	Fugitive dust as a result of Project construction	Dust and Emissions Control Plan	AAC Title 18, Chapter 2, Article 6
ADEQ	Construction activities impacting 1 acre or more	Arizona Pollutant Discharge Elimination System (AZPDES) stormwater permit for construction	Clean Water Act (33 U.S.C. 1344) Section 402
ADEQ	Required for potential discharge of storm water from an industrial site	AZPDES stormwater permit for operations	Clean Water Act (33 U.S.C. 1344) Section 402
ADEQ	Generation, storage and tracking disposal of hazardous waste during Project construction and operation	Hazardous waste generator registration	Hazardous Waste Control Act of 1972
Arizona Department of Agriculture	Displacement or removal of regulated native plant species as a result of construction activities	Permit for Arizona Protected Native Plants and Wood Removal	Native Plant Law (ARS 3-901 through 916)
Arizona Department of Water Resources	Well drilling activities	Well drilling permit, general industrial use permit, and water development plan, as necessary	Groundwater Management Code ARS Title 45-454

Table 1-2 Summary of Potential Major Agency Authorities and Actions

Agency	Proposal Requiring Action	Permit, License, Approval, Compliance, or Review	Relevant Law and/or Regulation
SHPO (a division of Arizona State Parks)	Project activities (i.e., grading, trenching or other construction) may have potential to have adverse effects to historic properties	Compliance with Section 106 of the National Historic Preservation Act in consultation with agencies, Indian tribes, the applicant, and other parties	National Historic Preservation Act, Section 106, 36 CFR 800
Arizona Game and Fish Department	Project activities (i.e., grading, trenching or other construction) may have potential to impact fish and wildlife	Coordination with AGFD regarding impacts to fish and wildlife	ARS 17-102 and 231, which address all fish and wildlife in Arizona as trust resources of the State of Arizona; Memorandum of Understanding between BLM and Arizona Game and Fish Commission Agreement Number AZ-930-0703
Arizona Department of Transportation (ADOT)	Transport of oversized loads on roads under ADOT jurisdiction	Heavy haul permit	ARS 28-7053, AAC R 17-3-501 through 509
ADOT	Encroachment by facilities on highway rights-of-way (e.g., transmission lines, pipes, new roads, etc.)	Encroachment permit	ARS 28-7053, AAC R17-3-501 through 509
COUNTY			
Mohave County, Development Services	Project construction	Grading permit	Mohave County ordinance
Mohave County, Development Services	Project construction	Building permit	Mohave County ordinance
Mohave County	Project construction and operation	Compliance with, and amendment of the Mohave County General Plan	Mohave County General Plan
Mohave County	Septic system for operations and maintenance building	Septic permit	Mohave County ordinance
Mohave County	Temporary use of the Materials Source (Detrital Wash Materials Pit)	Flood use permit	Mohave County ordinance
Mohave County	Project construction	Zoning Ordinance compliance; Application to establish an energy overlay zone	Mohave County Development Services Department Zoning Ordinance, Sections 27.P and 27.X

1.4 LAND USE PLANNING

A majority of the proposed action would be located on BLM-administered public lands. Other portions of the proposed action would be located on Federal lands administered by Reclamation.

BLM is responsible for managing public lands in accordance with all applicable laws, including FLPMA and NEPA. BLM has reviewed the development plans for the proposed action and, if the proposed Project is approved, will ensure (through the NEPA process and application of appropriate mitigation) that public land resources would be adequately protected and that the proposed Project would comply with all applicable state and Federal laws. BLM reviewed the BLM KFO Resource Management Plan (1995) to ensure the proposed action would conform with the management objectives and decisions in the plan (Appendix A). The proposed action would conform with BLM land use management plans, policies, and programs and is described in Chapter 2 (Proposed Action and Alternatives) of this EIS.

Reclamation is responsible for managing Federal lands for Reclamation project purposes in accordance with all applicable laws. While Reclamation does not have a land use plan comparable to the BLM KFO Resource Management Plan, Reclamation has reviewed the development plans for the proposed action to ensure that adequate protection is provided against unnecessary degradation of public land resources and that the proposed action would comply with all applicable state and Federal laws. Conformance of the proposed action with Reclamation policies and directives and standards is described in Chapter 2 (Proposed Action and Alternatives) of this EIS.

The 1995 Kingman BLM Resource Management Plan and the 2010 revision of the Mohave County General Plan[6] were considered when evaluating potential impacts on land ownership and use patterns in the Project vicinity. The land use designation in the 2010 Mohave County General Plan for land that includes the Project vicinity is Rural Development Area. BP Wind Energy voluntarily applied for an amendment to the County's General Plan and rezoning to apply appropriate land use designations, including an energy overlay zone, to the Wind Farm Site and other Federal lands proposed to be used for the Project. The County General Plan states that Mohave County should "coordinate its planning efforts with those of state and Federal agencies in order to set and carry out compatible planning and development policies" (Mohave County 2010). A General Plan Amendment and a Rezoning Resolution were approved by the Mohave County Board of Supervisors on August 6, 2012, that provides consistency with the County's adopted land use designations and zoning. Although the setback from private land was not changed and remains to be a one-quarter mile requirement, the Board of Supervisors requested in both the General Plan Amendment and Rezoning Resolution that a setback of one-half of a mile between the wind turbines and the private properties abutting the Project Area be considered.

1.5 FEDERAL, STATE, AND COUNTY LAWS, REGULATIONS, AND POLICIES

This EIS complies with NEPA, as amended, Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR Parts 1500-1508), and Department of the Interior and BLM policies and manuals, including the BLM NEPA Handbook (BLM 2008b). The policies and BMPs for wind energy ROW authorizations established in the 2005 ROD for BLM's Wind Energy Development PEIS, as well as the management objectives, decisions, and BMPs from the KFO Resource Management Plan apply to the proposed Project as well.

A summary of potential major Federal, state, and county agency authorities and actions is presented in Table 1-2 in Section 1.3.2 of this EIS.

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[6] The Mohave County General Plan was initially adopted September 7, 1965, and has been periodically revised. The most recent revisions to the text of the General Plan were approved on November 15, 2010.

1.6 LEAD AGENCY AND COOPERATING AGENCIES

The BLM is the lead Federal agency responsible for preparing the draft and final EIS and conducting the associated analysis. Most of the Project Area is within the jurisdiction of the BLM's KFO; therefore, the KFO is the lead BLM office for the proposed action. The KFO is responsible for consultations required by Section 7 of the Endangered Species Act of 1973, as amended, and Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended.

By law, cooperating agencies include those with Federal, state, or local agency jurisdiction, responsible for evaluating permits or approvals for the Project, and may, if required, rely on the analysis in this EIS (40 CFR Section 1501.6). Cooperating agencies also may include agencies with special expertise or information that will assist in development of the analysis in this EIS, even when the agency does not have jurisdiction over the Project. Consideration of connected and cumulative actions by the cooperating agencies in a single EIS improves overall interagency coordination and expands the scope of a NEPA analysis (BLM 2008b).

BLM invited tribes to participate as cooperating agencies through a letter distributed in September 2009 (see discussion in Section 1.7). In November 2009, BLM sent letters to various Federal, state, and county agencies inviting participation as cooperating agencies in the preparation of this EIS. Six entities accepted the invitation to serve as a cooperating agency: Reclamation, Western, NPS, Hualapai Tribe, AGFD, and Mohave County.

1.7 GOVERNMENT-TO-GOVERNMENT CONSULTATION

As a component of serving as the lead Federal agency for compliance with Section 106 of the National Historic Preservation Act, BLM initiated consultation with Federally recognized tribes, including the Chemehuevi Tribe, Colorado River Indian Tribes, Fort Mojave Tribe, Havasupai Tribe, Hopi Tribe, Hualapai Tribe, Kaibab Paiute Tribe, Las Vegas Paiute Tribe, Moapa Band of Paiutes, San Juan Southern Paiute Tribe, Yavapai-Apache Nation, and Yavapai-Prescott Indian Tribe, as well as the Federally unrecognized Pahrump Paiute Tribe. In September and October 2009, BLM invited the tribes to be cooperating agencies in preparing the EIS. The Project is within the traditional territory of the Hualapai Tribe, and the Hualapai Department of Cultural Resources accepted BLM's invitation to be a cooperating agency. The Hualapai Tribe participated in preparation of the EIS and members of the Hualapai Department of Cultural Resources participated in the cultural resource field survey. The Hopi Tribe declined to participate as a cooperating agency, and no response was received from the other tribes.

The tribes were sent scoping notices in November 2009, and were invited to a government-to-government meeting and field tour that was held in March 2010. In August 2010, a scoping meeting was held at Peach Springs on the Hualapai Reservation to provide information and to solicit comments about modifications to the proposed wind farm. In October 2010, BLM sent letters to the tribes to provide preliminary information about the cultural resource field survey results, and to solicit comments about the modified Project. BLM hosted a second field tour for the tribes and agencies in April 2011. The BLM Kingman Field Office manager participated in face-to-face meetings with officials or representatives of the Hualapai Tribe, Fort Mojave Indian Tribe, Colorado River Indian Tribes, Yavapai Prescott Indian Tribe, and Las Vegas Paiute Tribe. The Hopi Tribe and Moapa Band of Paiutes were unable to attend meetings but requested continued consultations. In response to a request, BLM provided information about potential impacts on raptors to the Hopi Tribe in May 2011. In July 2011, BLM distributed copies of the draft cultural resource survey report to the tribes for review and comment and informed the tribes of an expansion of the proposed Project boundaries that required supplemental cultural resource survey. In January 2012, BLM consulted the tribes about determinations of National Register eligibility and the effect of the Project on National Register-eligible properties and provided copies of all the final cultural resource reports prepared for the Project. The Hopi Tribe responded in February 2012, indicating that they had reviewed the cultural resource report and deferred participation in the Memorandum of Agreement (MOA) to the Hualapai Tribe, but requested continued consultation. BLM also arranged for the Hualapai Tribe to conduct an ethnohistoric study to further investigate traditional cultural use of the Project Area and inventory and evaluate traditional cultural resources. In June 2012, the BLM began coordinating with the Hualapai Tribe and other consulting parties to prepare a draft MOA to resolve potential adverse effects of the Project on National Register-eligible properties. Copies of the draft MOA were transmitted to the tribes in July 2012 with invitations to participate in a meeting at the BLM Kingman Field Office on August 15, 2012 to review and discuss the draft agreement. The BLM continued to consult with tribes in completing a final version of the MOA, which was signed by BLM, Reclamation, SHPO, Western, National Park Service, and Hualapai Tribe in November and December 2012 (Appendix G).

1.8 ISSUES TO BE ADDRESSED IN THE EIS

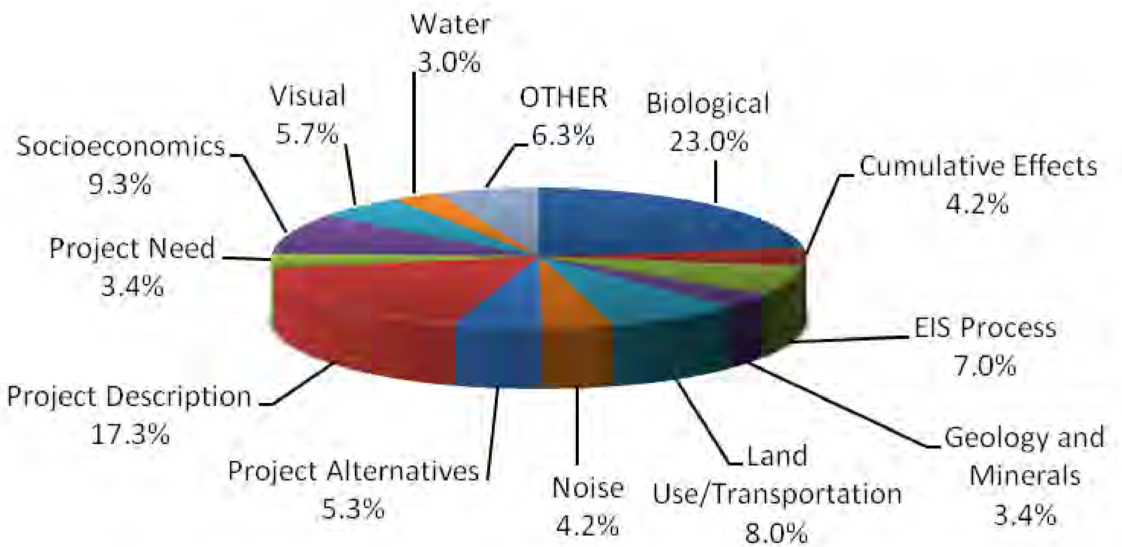
NEPA requires Federal agencies to focus their analysis and documentation on the environmental issues related to a proposed action and its alternatives. Environmental issues are defined very broadly under NEPA to include ecological, aesthetic, historical, cultural, economic, social, and health impacts (40 CFR § 1508.8). Issues are identified through public scoping, which occurs early in the NEPA process. Public scoping for the proposed action was initiated on November 20, 2009, when BLM published a Notice of Intent (NOI) to prepare an EIS in the Federal Register. The NOI briefly described the purpose of and need for the proposed action, the Project location, infrastructure associated with the proposed action, and BLM's plan to hold agency and public scoping meetings.

In consideration of public scoping comments and preliminary environmental studies, BP Wind Energy decided to modify its application with BLM to exclude certain public lands and to file an application with Reclamation to develop a portion of the proposed wind farm on approximately 8,960 acres of land administered by Reclamation. Because of this change in the Project description and the involvement of land managed by another agency, a second NOI was published in the Federal Register on July 26, 2010. Additional public scoping meetings were announced and the public was again invited to identify additional issues.

According to the BLM NEPA handbook, "an issue is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect" (BLM 2008b). Issues can help to shape a proposed action and direct the development of alternatives, for example, through the identification of design features or mitigation measures that may reduce potential impacts. Issues include those raised externally during the scoping process by individuals; special interest groups; American Indian Tribes; and Federal, state, and local agencies. BLM also has identified issues through internal scoping among BLM interdisciplinary staff. The scoping process is described in Chapter 5 (Consultation and Coordination) of this EIS and in the Scoping Report and supplemental Scoping Report, which are available on the BLM website (www.blm.gov/az/st/en/prog/energy/wind/mohave.html) and at the BLM KFO. The Scoping Report also contains a summary of issues identified by BLM during internal scoping as well as issues that were raised but are not addressed in this EIS.

A summary of issues that were raised most frequently during the public and agency scoping period are shown in Figure 1-1 and described below. The category of "Other" represents a compilation of Air Quality, Cultural/Archaeology, and Hazardous Materials/Safety categories; each of which accounted for less than 3 percent of the comments individually.

Figure 1-1 Summary of Significant Issues Raised During Public Scoping



1.8.1 Proposed Action and Alternatives

Scoping comments related to the proposed action and alternatives are summarized by issue below.

Project Description – Many questions were received on various Project description elements, such as where the access roads would be located, how Project decommissioning would occur, how components would be transported to the Project site, and how much power the Project would generally produce. A number of questions in this category related to which parcels of private property could be affected by or included in the Project footprint.

Project Purpose and Need – In general, comments in this category pertained to the potential consumers of the energy that would be produced by the wind farm. Most comments in this category were from residents near the Project Area, inquiring whether or not they would receive the power or benefit from lower energy costs. Agency comments in this category pertained to how the need for the proposed action should be discussed in the Draft EIS.

Project Alternatives – Most of the comments received on Project alternatives regarded the evaluation of other sites, including previously disturbed sites or sites that would avoid the use of public lands. Other comments in this category suggested the consideration of other technologies and alternative ways to meet energy demands.

EIS Process – Many comments in this category regarded the scoping process, including statements about the timing of notices, the length of the comment periods, and the availability of Project information. Some comments, primarily received from agencies or special interest groups, provided recommendations for the level of study that should be completed for the EIS.

1.8.2 Environmental Impacts

Scoping comments related to the natural and human environment are summarized below.

Cumulative Effects – More than half of the comments regarding cumulative effects referenced other proposed solar or renewable energy projects, both in the local area and on public lands. Concerns were stated for cumulative effects to visual resources, loss of public land, open space, water supplies, and native species as a collective result of proposed renewable projects.

Air Quality – All comments in this category were received from agencies with permitting or review authority or special interest groups. Several comments related to how air quality and climate issues should be considered and addressed in the EIS.

Biological Resources – A majority of the issues identified in public comments focused on potential impacts to biological resources, particularly special status species and bat and avian species. Eight percent of all comments received addressed bat and avian species. Other comments focused on potential habitat disturbance and questions regarding revegetation and restoration after Project construction. Most comments in this category were submitted by agencies or special interest groups with a particular focus on the management or preservation of biological resources.

Cultural Resources – Most of these comments were received from agencies (i.e., SHPO) or tribes indicating concern for potential impacts to archaeological and historical sites and places of traditional cultural importance.

Geology and Minerals – The comments on geology and minerals focused on potential effects to mineral exploration and effects to existing mineral rights holders.

Land Use, Recreation, and Transportation – Most of the comments received regarding land use focused on potential impacts to adjacent residences, private property (particularly for land that was once part of the Project but was subsequently eliminated after the initial scoping meetings when the Project footprint was revised), and to the adjacent communities of White Hills and Dolan Springs. Other comments questioned whether or not access to the area would be closed or maintained, and how increased access to the area would impact wildlife and other resources.

Noise – Comments regarding noise focused on noise produced by the turbines during operation and the potential effects to residences and adjacent recreation areas.

Socioeconomics – Residents or private property owners near the Project Area noted issues related to socioeconomics or land use. These categories included comments on employment, economic benefits (i.e., local income generated from tourism and spending or an increase in the tax base), and property values.

Visual Resources – Comments on visual resources focused primarily on potential effects to views and the visibility of Project facilities from nearby residences, places of traditional cultural importance, and recreational resources.

Water Resources – Agencies with permitting or review authority submitted the majority of the comments regarding water resources and included recommendations for water resource studies that should be included in the EIS. A few comments regarding water use were received from the public.

Other – Scoping comments categorized as other included requests for information, requests to be added to the mailing list, or inquiries regarding other projects in the area. Several comments indicated support for a development of wind energy projects in general or expressed thanks for the information presented during the scoping meetings.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the proposed action, the Mohave County Wind Farm Project (Project) as proposed by BP Wind Energy, and the alternatives being considered. BP Wind Energy has filed right-of-way (ROW) applications with the Bureau of Land Management (BLM) and Bureau of Reclamation (Reclamation) for the development, operation, and decommissioning of a wind farm in Mohave County. If the proposed wind farm is approved, there would also need to be an interconnection with one of the existing transmission lines passing through the Project Area so the generated power can be sold and used to satisfy demand for electrical power. Although the interconnect agreement with BP Wind Energy would be executed by Western Area Power Administration (Western) for the Liberty-Mead 345-kilovolt (kV) transmission line or by Salt River Project for the Mead-Phoenix 500-kV transmission line, Western would construct, operate, and maintain the switchyard regardless of which transmission line is selected. Therefore, if the Project is approved, Western would apply to BLM for a ROW grant for the Project's switchyard. As a result, the proposed agency actions are for BLM and Reclamation to grant ROWs and for Western, as the operating agent conducting the interconnection studies and building the switchyard facilities, to allow access to the transmission system.

Some Project components can be specified based on identified needs, such as the size of the operations and maintenance building, the width of interior access roads, or the need for pad-mounted transformers at the base of the turbines. However, various options are being considered for some Project components, such as the color of the turbines and the transmission line interconnection point and associated switchyard location.

The Project components, including those with variable options, are described in this chapter. Describing and analyzing the component options that comprise the Project provides the decision maker the information needed to assess Project impacts regardless of which combination of options is selected.

Four action alternatives and the no-action alternative are evaluated in this Environmental Impact Statement (EIS). Alternative A represents the Project as BP Wind Energy proposes to build and operate it. Alternatives B and C would reduce the footprint of the Wind Farm Site, compared to Alternative A. Alternative D is the no-action alternative, in which ROW approvals and the interconnection request would not be granted, and the Project would not be constructed. Alternative E would reduce the footprint compared to Alternative A and is the Agencies' Preferred Alternative. Alternative E is a mix of Alternatives A and B that responds to information regarding a golden eagle breeding area and to minimize potential effects on Lake Mead National Recreation Area (NRA). Alternative E would reduce development in the northwest portion of the Wind Farm Site similar to Alternative B, but would include development in some turbine corridors considered with Alternative A, while providing a minimum one-quarter mile setback of turbine development from adjacent private land. Under all alternatives except Alternative D, Western would construct, operate, and maintain the switchyard, and under all alternatives requiring a 345-kV interconnection would replace the existing 345/230-kV transformer at, located south of Boulder City, Nevada, with two new 345/230-kV transformers and ancillary equipment. All work would occur entirely within the previously developed and disturbed Mead Substation.

Section 2.2 provides an overview of the site selection criteria used by BP Wind Energy to choose the White Hills area of Mohave County for the Project. Section 2.3 describes the Project's conformance with BLM's Land Use Plan, and Section 2.4 describes the application of Best Management Practices (BMPs). Based on past experience with similar circumstances, BMPs are regarded as those practices (including techniques, methods, processes, and activities) that have been demonstrated to be the most efficient and effective approach to achieve desired results, and are included in the proposed Project Plan of Development. Section 2.5 describes the Project, including construction of the proposed wind farm, operations and maintenance, and decommissioning of the Project. Section 2.6 describes the alternatives. Sections 2.7 and 2.8 address Project design requirements and bonding. A description of the alternatives that were considered but eliminated from detailed study in this EIS is described in Section 2.9.

2.2 SITE SELECTION PROCESS

There are four key siting criteria required to make a wind farm project economically and technically feasible and practical. These include the potential for a high quality wind resource, available land, access to suitable transmission facilities, and few known environmental issues.

2.2.1 High Quality Wind Resource

The siting of large-scale wind energy facilities is constrained by the need for a location with sufficient wind speeds (in the range of 9 to 56 miles per hour [mph]) on a regular basis throughout the year given current turbine technologies. The lack of a suitable wind resource would prevent a project from producing energy at a cost that is competitive with that of alternative projects in the region.

In selecting a potential wind farm site, BP Wind Energy focused on the northwest quarter of Arizona where wind speeds are unusually high and consistent relative to those generally in the rest of the state and the region. The side slopes of the White Hills in Mohave County, Arizona provide a unique combination of sufficient wind resource, the presence of suitable transmission access, good physical access, and relatively few anticipated environmental constraints, including low residential population density (Germain 2010).

This region is not as well exposed to broad-scale energetic upper-level wind flows as are many of the other regions being developed for wind energy production throughout the United States. However, there are mesoscale[1] circulations driven by regional thermal contrasts that do produce sufficient wind flow for a project of this magnitude. The Colorado River Valley appears to enhance one of these patterns with a primary up-valley flow from the south and a secondary drainage flow from the north-northeast. Therefore terrain features with good exposure to this flow pattern make it an attractive candidate location (Germain 2010).

BP Wind Energy began monitoring the wind resource of the Project site in 2003 through the installation of two meteorological towers (met towers) authorized through ROW grants from the BLM; additional met towers were installed in later years. Data from these met towers validate that the wind resource is indeed of high quality with sufficient wind speeds on a regular basis.

2.2.2 Available Land

A large area of land must be available for a large-scale wind energy project. Land owners and/or public/Federal land managers must be willing to negotiate leases or other authorizations to allow the use of the land for wind turbines and associated facilities. While various existing land uses may be compatible with a wind farm on the same site or an adjacent site, it is important that the proposed site itself does not have conflicting land uses such as dense urban development, mining development, wilderness areas, wilderness study areas, national parks and monuments, or national conservation areas and other uses not related to ground use, such as, low-level aviation flight paths, and military radar coverage.

[1] Pertains to meteorological phenomena, such as wind circulation, that range in size from a few miles to about 100 miles in horizontal extent.

Land in the Project Area is undeveloped, as is much of the surrounding land. Some land uses in the vicinity have historically included or currently include dispersed residential development, livestock grazing, dispersed recreation (particularly on the BLM-administered lands and Lake Mead NRA lands), and mining. Industrial-scale wind farm projects are generally considered compatible with these land uses. In addition, the Project Area has good access with a major highway (US 93) within about 3 miles of the Project site and existing dirt roads passing through portions of the site. In contrast, many of the mountain ranges in the region did not offer suitable physical access from a civil engineering perspective.

Federal and private lands within the vicinity of the Project Area were suggested as alternative locations for the Project but were eliminated as potential siting areas because they failed to meet the siting criteria. The Project Area itself was modified from a larger area in response to public comment and other possible environmental issues. The areas eliminated from further analysis are described further in Section 2.9.

2.2.3 Suitable Transmission

Large-scale wind energy facilities must be located within a reasonable distance of an interconnection point on a transmission line with sufficient capacity to allow for the economical delivery of power to customers on the regional electrical grid. A reasonable distance is determined in part by the capital cost of transmission line construction.

Two high-voltage transmission lines with available capacity to transmit power from the proposed wind farm pass through the Project site. These are Western's 345-kV Liberty-Mead transmission line and Western's 500-kV Mead-Phoenix transmission line.

2.2.4 Environmental Issues

Large scale wind energy projects are ideally located in areas that avoid significant environmental issues such as major bird migration pathways, areas of particularly sensitive habitats, areas rich in cultural resources, areas highly sensitive to visual intrusions, or conflicting activities such as airports or low-level military training routes.

BP Wind Energy began conducting preliminary environmental studies of the land on BLM-managed portions of the Wind Farm Site in 2007, with particular attention to biological resource concerns (bats, birds, special status species, and wetlands). The preliminary baseline ecological study of the land on BLM-managed portions of the Wind Farm Site did not identify particularly sensitive environmental features or habitats in the study area.

2.3 CONFORMANCE WITH KINGMAN RESOURCE MANAGEMENT PLAN AND BUREAU OF RECLAMATION DIRECTIVES AND STANDARDS

The generation and transmission of electricity are among those uses for which ROW may be issued under the Federal Land Policy Management Act (FLPMA). In addition, the Project must comply with BLM's existing Land Use Plan for the Project Area. The Kingman Resource Management Plan (RMP) (BLM 1993) shows the Project Area is allocated for grazing, dispersed recreation (including some off-highway vehicle use on existing roads and trails), and a utility corridor that coincides with the existing transmission lines in the area. The BLM reviewed its Kingman RMP (BLM 1993) approved by the Record of Decision dated March 7, 1995 (BLM 1995) and determined that wind energy development was not disallowed or addressed in the RMP. When an RMP is silent on an issue, BLM guidance provides that BLM review the broad and programmatic goals and objectives in the RMP to determine if a project is in conformance with the RMP.

The original application was initially in conflict with RMP Decision LR13 because a portion of the application included land within the Mead-Phoenix one-mile-wide power transmission line corridor. This corridor was established for long distance infrastructure needs, but does provide for short transmission facilities, such as grid tie-in transmission lines. Although access roads and collector systems are proposed within the utility corridor, BP Wind Energy voluntarily agreed not to build turbines within the utility corridor, thus avoiding a conflict with the RMP.

Based on this review, BLM determined that the Project contributes to meeting the goals and objectives in the RMP, is not inconsistent with the RMP, and is therefore in conformance with the RMP and no amendment is needed to the RMP (see consistency review in Appendix A). The Project evaluated in this EIS is also consistent with the President's Energy Policy Act of 2005; Advanced Energy Initiative of 2006; and the BLM Instruction Memorandum No. 2009-043*, Wind Energy Development Policy* (BLM 2008a). Reclamation has determined that the Project is in conformance with Reclamation Directives and Standards for Land Use Authorizations (LND 08-01).

In January 2013, BLM amended the Kingman RMP to implement the goals, objectives, management actions, land use allocations, design features, and BMPs identified by the Restoration Design Energy Project, a planning process for the development of renewable energy resources on BLM-administered public lands in Arizona. The Mohave County Wind Farm Project continues to be in conformance with the amended RMP.

2.4 BEST MANAGEMENT PRACTICES

Construction of the Project would be subject to BLM's BMPs, which are designed to guide project planning, construction activities, and development of facilities to minimize environmental and operational impacts. BMPs include standards associated with overall project management, surface disturbance, facilities design, erosion control, revegetation and other mitigation, hazardous materials, project monitoring and responsibilities for environmental inspection. The Project would develop wind energy resources in compliance with the BMPs that were evaluated in the *Final Programmatic Environmental Impact Statement for Wind Energy Development on BLM-Administered Lands in the Western United States (*Final Wind Energy PEIS [BLM 2005a]). Project construction and operations would incorporate the BMPs as stated in Attachment A of the *Record of Decision for the Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments* (BLM 2005b); these BMPs are included as Appendix B of this EIS and have been incorporated in the Project.

2.5 PROPOSED ACTION

As introduced in Chapter 1 of this EIS, the Project is proposed in the White Hills of Mohave County about 40 miles northwest of Kingman, Arizona. The Wind Farm Site includes about 38,099 acres of public land managed by the BLM and 8,960 acres of land managed by Reclamation; additional land would be needed for access to the Project site (estimated at about 75 acres) and a power distribution line within the access road ROW. In response to the application to use this land for the proposed Project, the BLM segregated these public lands from appropriation under the public land laws including the mining law, but excluding the mineral leasing or materials acts, for a period of two years beginning March 2, 2012 when the segregation notice was published in the Federal Register.

The Project is based on a corridor approach, in which defined areas with adequate orientation to the wind resource were identified across the site for the potential placement of turbines, roads, collection system, and transmission lines. The defined corridors allowed a more focused approach on the planning and environmental review of select portions of the site, while considering the overall impact to the entire area. The defined corridors also maintained the flexibility to choose a specific turbine consistent with the range of turbines analyzed in the EIS. The flexibility to choose a specific turbine at the BLM Notice to Proceed and/or Reclamation right to use authorization stage is critical due to the length of time necessary to prepare an EIS and process the right of way applications, the changing availability of different turbine models in the market, whether a particular turbine manufacturer may or may not be able to deliver on a schedule that meets contractual obligations of the power purchase agreement, the economic viability of each turbine relative to the wind resource, the possibility of building the Project in more than one construction interval, and the changing technology (i.e., rotor lengths increasing to better capture lower wind speeds) that occurs in turbine models each year.

Within the areas identified for development, detailed surveys were carried out for land-based natural and cultural resources. The precise placement of each turbine within the corridors would be determined prior to BLM and Reclamation issuing (respectively) Notices to Proceed and right of use authorizations.

By proposing corridors, BP Wind Energy preserves important flexibility in the selection of turbines and the placement. Given the long permitting times for a development of this scale on federal lands (the development ROW application for the Project was filed in 2006), by selecting the precise type and placement of turbines at the time of construction design, BP Wind Energy would be able to best maximize the Wind Farm Site's wind resources. In addition, within each corridor the construction siting process would take into account not only environmental constraints but also engineering, construction and safety factors (i.e. soil geology, required separation distances between electrical lines, etc.) and each turbine location placement would be approved by BLM or Reclamation during Notice to Proceed and right of use authorizations, respectively. Thus, the turbine placements shown within corridors in the figures and maps throughout this document represent approximate spacing based on turbine model and size. While the actual spacing and number of turbines that would be built within each corridor would reflect a wide range of variables, impacts of the maximum number of turbines within the corridors have been analyzed in the EIS (see Table 2-6).

The Project's energy generating capacity would be dependent on the turbine type, placement and number of turbines within approved corridors, and the transmission line selected. The power generation capacity is proposed to be 425 MW if the Project interconnects to the 345-kV Liberty-Mead transmission line, and 500 MW if the Project interconnects to the 500-kV Mead-Phoenix transmission line. Power generated by the Project would enter the regional electrical grid through a proposed interconnection with one of two existing transmission lines crossing the Project Area.

The Project's life-cycle includes site preparation and pre-construction activities, construction of all Project components, post-construction activities, operation and maintenance of the facility, and decommissioning. A detailed description of each of these Project stages is provided in the following sections.

2.5.1 Site Preparation and Pre-Construction Activities

During final design, detailed plans would be developed to further guide site preparation, construction, and post-construction. This includes but is not limited to the following attachments that are included in the Plan of Development: the Integrated Reclamation Plan; Transportation and Traffic plan (which also would address the transport of equipment); a Health, Safety, Security, and Environment (HSSE) plan (including emergency response and waste management); Facility Security plan; and Spill Prevention plan. These plans, along with the Site and Grading Plan (which would incorporate the Flagging Plan and construction drawings), and an updated Plan of Development would be reviewed and approved by appropriate agencies with jurisdictional or technical expertise or regulatory responsibilities, including but not limited to BLM, Reclamation, Western, and Mohave County.

Before construction can commence on a turbine corridor or specific location (substation, laydown, etc.), a licensed surveyor or professional engineer would perform a site survey to stake out the exact location of the wind turbines, interior roads, electrical lines, substation areas, and other major Project features. If Project features or construction activities are determined to extend beyond the corridors that were surveyed for cultural and biological resource concerns, no construction would begin at these locations until environmental clearances are completed. Locations of sensitive resources would be flagged or clearly marked in and around the Project work area to identify any possible conflicts or to distinguish areas to be avoided and/or areas requiring cultural resource, biological, paleontology, or weed monitoring. Construction limits would be flagged on each turbine corridor or specific location in accordance with the approved Flagging Plan to ensure marking features are clearly visible and accurately positioned.

A geotechnical investigation would be conducted and would include standard penetration test borings at six proposed turbine sites to visually characterize the soils and to obtain samples for laboratory testing. Suitable geotechnical investigation equipment would be used for the geotechnical investigation, such as a small vehicle or all-terrain vehicle (ATV)-mounted drill rig. The rig would bore to the engineer's required depths, and a backhoe would be used to identify the subsurface soil and rock types and strength properties by sampling and lab testing. The turbine borings would be approximately 6 inches in diameter and would be extended to a depth of 50 to 65 feet to adequately determine the quality/character of the bedrock. The boring would not be as deep if suitable foundation characteristics are identified at a shallower depth. Soil samples would be collected and laboratory tests of the samples would be conducted. The geotechnical investigation for support of the preliminary roadway design would include collection of a series of eight bulk soil samples from depths of approximately 1 to 2 feet at locations across the Project site. In-situ electrical resistivity tests and bulk samples for thermal resistivity testing would be performed at the six turbine boring sites and at the proposed substation location. Electrical resistivity testing measures how well the soil conducts electricity. This is primarily used in the design of the grounding grids, which are used to dissipate electricity into the ground. Thermal resistivity testing measures how well heat is dissipated into the soil. This is primarily used in the design of the underground collection circuits to ensure the heat generated by the cables does not exceed the cable's specification. All test pits and soil boring locations would be back-filled after the soil samples are obtained and rehabilitated if the Project is not constructed.

If required, additional geotechnical investigations would be performed to further identify subsurface conditions, which would dictate much of the design specifications of the roads, foundations, underground trenching, and electrical grounding systems. Testing also would be completed to measure the soil's electrical properties to ensure proper grounding system design. At this time additional test borings and soil testing would be conducted. One boring would be completed per turbine location, plus approximately three borings at the substation and operations and maintenance (O&M) building. In addition, approximately 20 to 40 soil samples would be taken along the road/collection corridors. The process would be largely the same as described above, but for the samples along the primary access road from US 93 and interior roads, a small backhoe or shovel would be used to dig a sample test pit a few feet deep to obtain soil samples and then the test pits would be refilled.

About one week prior to the start of construction at any given site, an environmental inspector and agency inspectors/monitors (which may include agency staff and/or contracted environmental monitors), the construction contractor, and any subcontractors would conduct a walk-over of areas to be affected, or potentially affected, by proposed construction activities. These pre-construction walk-overs would occur regularly and are intended to identify and mark sensitive resources that were not identified as avoidance areas during pre-construction surveys, limits of clearing, location of drainage features (e.g., culverts, ditches), and the layout for sedimentation and erosion control measures. Upon identifying and marking these features, specific construction procedures would be reviewed, and any modifications to construction methods or locations required for conformance with previously approved plans would be agreed upon before construction activities begin. Relevant agency representatives would be consulted or included on these walk-overs, as needed. A Compliance and Monitoring Plan that includes a discussion of these activities would be approved prior to Notice to Proceed.

Regardless of when personnel join the construction team and begin work at the construction site, supervisors and work crews would go through orientation and training that would include Project safety rules, environmental and cultural awareness and compliance programs, and minimization of construction waste. An internal pre-construction conference would be held with agency representatives, BP Wind Energy, contractors, and consultants to review grants, stipulations, and the Plan of Development to highlight guidelines and mitigation measures. BMPs that would be implemented during site preparation and pre-construction activities are listed in Appendix B.

Site preparation work may include clearing (removing vegetation from the land), grading (leveling or smoothing and possibly compacting to a desired or horizontal gradient, typically done with a bulldozer), and blasting (using an explosive device to fracture and/or dislodge rock or other materials). Details regarding the equipment to be used during site preparation and pre-construction activities can be found in Appendix C. Sediment and erosion control measures would be implemented before any clearing and grading activities occur; these control measures would be in accordance with the Stormwater Pollution Prevention Plan (SWPPP) as well as BMPs (see Appendix B). The SWPPP is a plan for stormwater discharge that includes erosion prevention measures and sediment controls that, when implemented, will decrease soil erosion on a parcel of land and thereby decrease off-site nonpoint pollution. Areas to be cleared and graded would include the access road, laydown area, turbine and other facility locations, substation, switchyard, access routes within turbine corridors, and access to the transmission line corridor. Small areas around transmission line structure sites may also be cleared. Clearing would be performed only where necessary for construction or fire prevention and fuel management.

Bulldozers would typically be used to clear and grade land. Removed topsoil[2] bearing organic components would be used in reclamation that takes place during construction or stockpiled for Project reclamation, particularly to promote reseeding success in disturbed areas. Excavated waste rock and/or mineral soil underlying the topsoil would potentially be used for fill material where needed anywhere within the Project Area (such as to achieve desired grades or extend curve radii of roads after topsoil had been removed from those areas).

It may be necessary to blast rock to achieve the necessary slope and gradient for interior roads or for foundation construction. If required, blasting would be conducted in accordance with a Blasting Plan prepared in advance of construction and approved by BLM and Reclamation. The Blasting Plan, which would identify blasting locations, safety protocol, and notification procedures when non-construction personnel or developed property may be within range of the noise or vibrations, would not be completed until final engineering and design when geotechnical information is available and the need for any blasting identified. When completed, the Blasting Plan would be appended to the Project Plan of Development and made available on the BLM website and/or at the local BLM office. Blasting would be pre-engineered with each location assessed for apparatus or structures in the vicinity to determine the suitability of that location for blasting. Procedures identified by the construction contractor for conducting such work, as well as applicable Federal and state regulations, would be followed. Explosives would only be used within times and at specified distances from sensitive wildlife or surface waters, as established by the BLM or other Federal and state agencies. Explosive material would be handled only by a licensed, state-approved contractor that would have full responsibility for control and use of the material. The

[2] Surface soil usually including the organic layer in which plants have most of their roots.

material would be transported to and from the Project site on an as needed basis in accordance with Occupational Safety and Health Administration's (OSHA's) regulations for surface transportation of explosives found in 29 Code of Federal Regulations (CFR) 1926.902.

2.5.2 Project Components and Construction

Construction is anticipated to begin after permitting is complete and purchasers of the Project's power are identified, and would take approximately 12 to 18 months. Table 2-1 outlines the construction activities and their anticipated duration.

Table 2-1 Proposed Construction Schedule (Approximate)

Facility	Start	Duration
Road Construction	Week 3	25 weeks
Substation Construction	Week 4	32 weeks
Transmission Line Installation	Week 6	20 weeks
Foundation Construction	Week 7	28 weeks
O&M Building Construction	Week 8	16 weeks
Collection Line Installation	Week 9	22 weeks
Turbine Generator Installation	Week 11	35 weeks
Turbine Commissioning	Week 15	35 weeks
Site Restoration (Interim Reclamation)	Week 50	8 weeks

The number of construction personnel on site is expected to range from 300 to 500 (during peak construction). The number and types of trucks needed in various stages of construction are included in Appendix C. BP Wind Energy would encourage ride sharing to reduce the number of vehicles entering and exiting the site.

The components of the Wind Farm Site (as described in Table 2-2) would include wind turbines; foundations and pad-mounted transformers; electrical, communication, and distribution systems; interior access roads; substations; a switchyard; and ancillary facilities including an O&M building, temporary laydown/staging areas, mobile batch plants, and temporary and permanent met towers. The exact location of the wind turbines, roads, and transmission and distribution lines would be determined during final design following completion of wind resource data analyses and other environmental studies, including identification of construction constraints and sensitive cultural or natural resources to be avoided. However, proposed locations have been identified with buffers large enough to account for the anticipated minor adjustments in the placement of Project components during final design. The extremities of authorized disturbance areas would be flagged per the Plan of Development, Flagging Plan. Construction of the Project is anticipated to commence after BLM issues a Notice to Proceed, Reclamation issues a right of use authorization, Western issues a Notice to Proceed, and other necessary commercial agreements are issued. Ideally, the wind farm would be developed in a single construction interval. However, depending on the market for the power and the negotiated power purchase agreement, the proposed Project could potentially be developed in two or more construction intervals. Should more than one construction interval be necessary, plans would be coordinated with BLM and/or Reclamation to address treatment of temporary facilities and the reclamation schedule. Once completed, the wind energy facility is planned to operate for up to 30 years.

The key components that would comprise the Project are listed Table 2-2, which is followed by more detailed descriptions that are based on the Project Plan of Development (BP Wind Energy 2011) and coordination with the BP Wind Energy Project development team. Table 2-7 contains detailed information on the land requirements during construction and operation and maintenance.

Table 2-2 Key Project Components, Quantities and Land Requirements

Components	Quantity and Land Requirements for Operations	Purpose
Temporary Laydown/Staging Areas	Two areas (up to 32 acres)	Secure areas for temporary construction offices, construction vehicle parking, equipment and construction materials storage, and stockpiled soil storage
Temporary Concrete Batch Plants	Two areas (within laydown/staging areas)	Facilities for mixing concrete needed in construction
Wind Turbines	Up to 283	Generate power
Foundations and Pad-Mounted Transformers for the Wind Turbines	Up to 283 (foundations range from 50 to 60 feet wide and 8 to 10 feet deep)	Foundations support the turbines and transformers step up the voltage between the turbine and the electrical collection system
Electrical Collection System and Communications	Approximately 100 to 120 miles of 34.5-kilovolt collector lines (disturbance area accounted for with interior roads)	Connect each turbine to the substation and provide for communications between the turbine and substation
Electrical Distribution Substations	Two (approximately 5 acres each)	Step up the voltage of the electrical collection system for delivery through a high-voltage transmission line
Overhead Transmission Line	Approximately 6 miles in length with 8 support structures per mile for 345-kilovolt or 500-kilovolt line	Connect with existing regional transmission line to deliver Project power to purchasing utility
Interconnection Switchyard	One (up to 10 acres)	Interface at the interconnection point between the proposed transmission line and an existing regional transmission line
Mead Substation Transformer Replacement (applicable with a 345-kV interconnection)	Not applicable (within existing Mead Substation)	To provide adequate equipment, the existing 345/230-kV transformer and associated equipment at Mead Substation would be replaced with two new 345/230 transformers and ancillary equipment if the Project is interconnected to the 345-kV transmission line
Operations and Maintenance Building	One (up to 5 acres)	Employee facility for operation and maintenance of Project facilities and storage of supplies and maintenance equipment
Access Road	Approximately 3 miles of access road linking the Wind Farm Site to US 93	Provide primary access to the Wind Farm Site from US 93
Interior Roads	Approximately 85 to 111 miles within the Wind Farm Site	Provide internal access within the Wind Farm Site between facilities (turbines, substation, and operations and maintenance building)
Utility and Communication Lines	Approximately 5 to 10 miles	Provide operational power and communication abilities for on-site facilities
Meteorological Towers	Up to four permanent and up to 10 additional temporary met towers (9 square feet for each tower)	Monitor wind speed

SOURCE: BP Wind Energy 2013

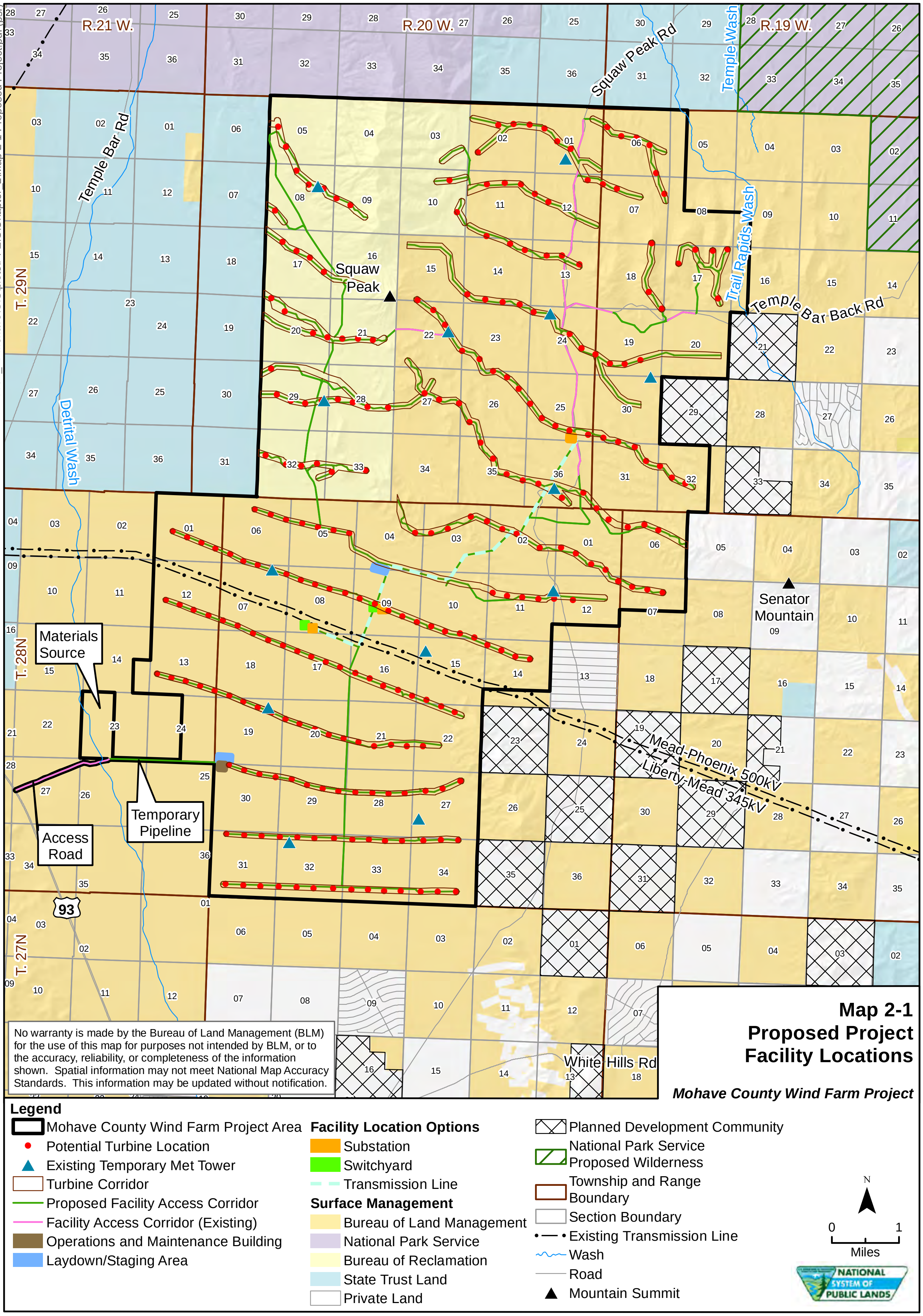
2.5.2.1 Temporary Laydown/Staging Areas

Secure laydown/staging areas (estimated at 11 acres for one area and 21 acres for a second area) would be established for temporary construction offices, temporary construction facilities (e.g., portable toilet trailer, portable amenities trailer, and mobile concrete batch plant), and materials/supply storage (e.g., turbine components, fuel for construction equipment, and stockpiled soil). Temporary construction trailers, construction offices, and vehicles may be parked within the boundary limits of the designated secure area or space, including adjacent to the Project laydown site where construction equipment and materials/supplies in transit are temporarily stored, assembled, or processed. The ancillary facilities and Project laydown site would be secured using an 8-foot-tall chain-link fence topped with barbed wire. A typical construction laydown area is shown in Figure 2-1.

Figure 2-1 Typical Construction Laydown Area

The location of the proposed staging areas would be strategically selected in an effort to avoid environmentally and culturally sensitive areas. The temporary construction facilities would be established in areas that are relatively flat, with the primary staging area near the site access point, adjacent to a proposed interior road. This would provide efficient access for materials and equipment being delivered to the staging area for disbursement to the proposed turbine sites. As shown in Map 2-1, two temporary laydown/staging areas have been identified in Township 28 North, Range 20 West with one location in Section 19 and the other straddling the section line between Sections 4 and 9.

Using bulldozers, the laydown/staging areas would be cleared of vegetation and topsoil to a depth of approximately 8 to 12 inches sufficient to properly stabilize for staging equipment and replaced with small gravel hauled by dual-train gravel hauler from the Materials Source at Detrital Wash Materials Pit (subject to a negotiated sales contract with BLM). Topsoil would be salvaged and stockpiled for use in site reclamation.



P:\ENVPLANNING\BP Wind AZ\23445692_BPMohave\GIS\plots\PFEIS\Chapter 2\Map 2-1 Proposed Project.pdf (psr)

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

All chemicals, fuel, and oil stored within these secured areas would be located in areas that provide for containment of spilled fluids in accordance with the Spill Prevention Control and Countermeasure (SPCC) Plan. Spill response kits containing items such as absorbent pads would be located on equipment and in the on-site temporary storage facilities to respond to accidental spills that may potentially occur. Construction personnel would be trained in spill response, the use of the spill response kits, and notification requirements. A chain-link fence approximately 8 feet in height would temporarily surround an area inside of the main laydown and staging areas to provide security for materials and equipment. If oil or grease is spilled or leaked from equipment, the contaminated soil would be removed and hauled to Silver State Disposal in Clark County, Nevada, which is an approved hazardous material dump. Used oil would be pumped into a truck and hauled to a recycling facility in Las Vegas, Nevada on an as needed basis.

Due to the nature of the material being stored, and activities taking place within the staging areas, stormwater runoff would be collected, conveyed, and/or stored in a manner compliant with industry standard BMPs and in compliance with a required SWPPP. For example, the sites would be graded to prevent runoff from entering natural washes. Following construction, the staging areas would be restored as near as practicable to prior conditions per the Plan of Development and Integrated Reclamation Plan. For example, this would include removal of devices used to anchor fences or other features to the ground, replacing gravel with topsoil, recontouring to natural conditions, and seeding the area to re-establish vegetation native to the area.

2.5.2.2 Temporary Concrete Batch Plants

This discussion of the operations associated with the temporary concrete batch plants includes the proposed mineral Materials Source to be used for materials used in the concrete mix, the batch plant facilities, the power source for batch plant operations, and the water source and quantities of water used.

Materials Source and Initial Processing

Source materials for batch plant operations are proposed to be obtained from mining the existing Materials Source, which is located in Section 23, Township 28 North, Range 21 West, near the proposed access road leading from US 93 to the Wind Farm Site. BP Wind Energy (or the batch plant contractor) would participate in a competitive bid or negotiated sale to extract materials from the quarry and would be issued a contract if the parties agree to the contractual terms.

The Materials Source (Detrital Wash Materials Pit) is a previously mined and highly disturbed area encompassing approximately 320 acres of the bed, banks, and associated floodplain. Prior mining activity within the Detrital Wash Materials Pit area was permitted by BLM, Mohave County Flood Control District, and the USACE. Access to the processing and mining area would be via an existing dirt road connected to the primary access road to the Wind Farm Site. A surface disturbance area of approximately 10 to 15 acres may be required, dependent upon aggregate quality, depth, and consistency of the area. Sand and gravel would be mined in a quarry located in the banks and within the channel of the Detrital Wash. It is anticipated that approximately 180,000 to 210,000 cubic yards of material would be extracted with each of the action alternatives. Excavation would be limited to a depth of approximately 8 feet, with 60-foot long tapers[3] left in place at both the upstream and downstream ends of the excavated area. The remaining side slopes within the quarry would be contoured to a 3:1 or flatter slope. Mined material would be transported via haul truck to the processing area which would be located outside and above the ordinary high-water mark of the wash. In the processing area, material would be stockpiled and screened. A minor amount of crushing may be required, but the in-situ aggregate is generally the size desired for the

[3] A convex type shape that narrows toward a point and is used to help control erosion.

Project. Oversized material would be stockpiled onsite and crushed for future uses such as roadway or over-excavation backfill materials. The processing area would be located in an area of the leased site that has previously been used for processing activities.

Mobile Batch Plant Facilities

Processed material would be transported via haul truck to one of two mobile batch plants, depending on where foundation work is under way. A primary mobile concrete batch plant would be established within the main laydown/staging area during construction to supply high strength concrete for wind turbine foundations and ancillary facility footings/slabs, primarily within the central and southern portions of the Wind Farm Site. A second mobile batch plant would be established in the northern part of the Wind Farm Site to reduce the haul time to foundations constructed in the northern part of the site. Each concrete batch plant would require a flat area of up to 2 acres.

Temporary concrete batch plant facilities typically consist of loading bays, hoppers and mixing equipment, cement and admixture silos, concrete truck loading areas, aboveground water storage tanks, and bins for aggregate and clean sand storage. Figure 2-2 shows a typical batch plant facility. The height and color of the batch plant equipment would vary depending on the equipment ultimately selected. Generally, facilities would have heights ranging from 30 to 50 feet. A washout area would be located within the laydown/staging area, with the concrete removed or covered by at least 3 feet of soil when the washout area is no longer needed. More typically, there also would be limited washout[4] at each turbine location within defined limits of disturbance for the turbines (excavated foundation areas) and covered by as much as 8 to 10 feet of soil as part of the turbine foundation backfilling process. Specific locations and use of the washout areas would comply with provisions in the SWPPP and would be monitored per the Environmental Construction and Compliance Monitoring Plan (ECCMP).

Figure 2-2 Typical Temporary Concrete Batch Plant

[4] The washouts at the turbine locations is needed to prevent damage to equipment from the buildup of concrete,

Power Source and Equipment

Electrical power for the batch plants would be supplied by a distribution line to the site or by diesel generator. The proposed power source for the primary batch plant would be via a tap on an existing UniSource Energy line with a distribution line installed to extend from the tap, along the west side of US 93, on existing power poles, crossing US 93 (either underground or above ground), and then along the primary access road to the Wind Farm Site. Power for the secondary batch plant farther north within the Wind Farm Site would include the temporary use of a 500- to 750-kilowatt diesel generator and use number 2 fuel. The fuel would be stored in a 500-gallon on-site tank. Typical daily fuel usage for the generator would range from 150 to 250 gallons. Containment to prevent/control potential spills would be in accordance with the SPCC Plan. Generator noise production varies by the model used, but should be less than 105 A-weighted decibels (dBA) (as measured at a distance of about 23 feet from the generator). A backup generator may be necessary, but it would only be put in operation if the primary generator is not functioning.

Production Needs

It is estimated that approximately 180,000 to 210,000 cubic yards of aggregate would be required for the turbine pad foundations, building foundations, and gravel for road surfaces, construction laydown area, substations, switchyard, and batch plant areas. Aggregate and water are planned to be obtained from the Materials Source located on the main access road to the Project Area, although the well that would be established at the O&M building may also serve as a source of water during construction. Cement would be delivered from off-site sources to the mobile batch plant in the Project Area. It is anticipated that approximately 10 cement trucks would be required to deliver off-site materials to the batching plants daily. Assuming a 26-week construction schedule, 1,300 round trips would be required for cement delivery. The concrete would be mixed and hydrated at the batching plant, and the concrete would then be delivered by truck to construction locations throughout the Project Area. (See Appendix C for more details on vehicle trips and cumulative volumes of materials.) The gravel and sand would be stored in bins located within the unloading/storage area, adjacent to the mixing plant. Cement and admixture materials would be stored in silos adjacent to the mixing plant, which would also provide protection from the weather. The storage facilities would not be moved during the course of construction; cement containers would be replaced or refilled as they are used. It is estimated that aggregate mining operations would continue between the 12- to 18-month Project construction period.

Each mobile batch plant would be capable of producing approximately 800 cubic yards of concrete per day, and, depending on permitting requirements from the Arizona Department of Environmental Quality (ADEQ), the two batch plants may be operated simultaneously. A total of approximately 180 tons of cement, 360 tons of sand, 810 tons of aggregate, and 25,000 gallons of water would be needed per day while mixing concrete at peak production (5 days per week for approximately 25 weeks) (Barr 2011). The batch plant would also require up to 1,500 gallons per hour to support operations such as truck washing and hydrating aggregate prior to mixing. These additional uses could consume between 3,000 and 15,000 gallons of water per day (assuming a maximum 10-hour work day); thus, it is expected that average daily water use at the batch plant would range from 28,000 to 40,000 gallons. Based on the 40,000-gallon daily water use estimate, cumulative water use to support the batch plant may be as much as 5.0 million gallons (15.3 acre-feet) over the life of the plant. It is anticipated that an additional 100,000 gallons of water would be needed per day, 5 days a week, for 39 weeks for dust control. This equates to a total usage of 19.5 million gallons of water, or 59.8 acre-feet. Combined water use for the batch plant and dust suppression would therefore reach approximately 75.2 acre-feet during construction.

Water Source

Water for dust control, batching water for concrete production, and other washing needs, would be obtained from three existing production wells at the Materials Source production site or a new well proposed at the O&M building. Table 2-3 provides the capacity of the existing wells and expected use of the well water.

Table 2-3 Well Capacity and Anticipated Water Use for the Project

Well Capacity		Water Required for Construction of the Project			
		Activity	**GPD**	**Weekly Requirement (5-day Work Week)**	**Total – 39* Weeks**
Well 1 GPM	1,000	Dust control	100,000	500,000	19,500,000
Well 2 GPM	400	Cement Production	25,000	125,000	4,875,000
Well 3 GPM (not expected to be needed)	200	Truck washing, hydrating aggregate	15,000	75,000	2,925,000
Total GPD	2,304,000		140,000		
Total GPW (5 day work week)	115,200,000			700,000	
Total 39* weeks (5 day work week)	449,280,000				27,300,000

GPM – Gallons per minute
GPD – Gallons per day
GPW – Gallons per week
*39 weeks was used as maximum time for dust control and cement production (rather than anticipated 25-week duration) to present a worst case scenario.

The wells owned by BLM near the Materials Source along Detrital Wash are permitted for industrial withdrawals. One of these wells, registration number 531378, has a permitted pumping rate of 60 gallons per minute with a well capacity of 1,000 gallons per minute. The capacity of this well would be able to meet most of BP Wind Energy's construction water needs. Any water demands in addition to what well 531378 can supply would be met using the other industrial water supply wells permitted to BLM at the Materials Source or the new well located at the O&M building permitted by the Arizona Department of Water Resources (ADWR). Water for production would be pumped from the wells, and a valve meter would be installed at each well to maintain overall usage during the course of mining activities. Water would be used for concrete production in the mobile batch plant. Water would be piped to the primary batch plant location near the primary access road. Surface-laid poly pipe is typically used for this type of temporary water pipeline. Water would be transported via water trucks to the batch plant established in the northern portion of the Wind Farm Site. If the new well at the O&M building is capable of meeting the needs of the batch plant and dust control, the O&M building well would supply the southern laydown site with water via a similar temporary surface laid poly pipe from the well location to the water storage location within the laydown site.

Two clay-lined ponds, each approximately 5 feet deep and with a surface area of 60 feet by 60 feet, would be located at the Materials Source processing site, with each pond having a 100,000 gallon holding capacity. The ponds would be used for storage and recycling of wash water, and used to contain the fine particles washed from the sand. Also, during peak usage, water may be stored in the ponds. When the Materials Source is no longer in use, the ponds would be reclaimed to prior existing conditions to the extent possible.

Aboveground storage tanks would temporarily store the water needed at the northern concrete batch plant. The dimensions and capacity of the water storage tanks would be determined based on the equipment available to the batch plant provider. However, typical tank sizes are 10,000 to 20,000 gallons each, 15 feet tall, and 12 feet in diameter. It is anticipated that storage capacity for approximately 50,000 gallons would be required on site. Post-construction water needs would be minimal and primarily limited to the water used by fewer than 40 operations and maintenance personnel for drinking water, washing, and keeping the office space within the O&M building clean. These water needs are addressed in Section 2.5.2.9.

2.5.2.3 Wind Turbines

As shown in Figure 2-3, a wind turbine consists of three main components: (1) nacelle, (2) tower, and (3) rotor blades. The nacelle houses the generator and gearbox and supports the rotor and blades at the hub. The turbine tower supports and provides access to the nacelle. The turbine hubs would be between 262 feet (80 meters) and 345 feet (105 meters) above the ground depending on the turbine selected. The turbine blades would extend between 126 feet (38.5 meters) and 194 feet (59 meters) above the hub. The rotor diameter likely would be between 252 feet (77.2 meters) and 388 feet (118 meters). Therefore, each turbine would have a rotor "swept area" of 50,300 square feet to 117,600 square feet. At the top of their arc, the blades would be between 390 feet (118.5 meters) and 539 feet (164 meters) above the ground.

BP Wind Energy may select turbines in the 1.5 to 3.0 MW range; these turbines may have slightly different hub heights and/or rotor diameters. BP Wind Energy utilized a corridor approach in permitting the Project to maintain the flexibility to choose a turbine in the approximate size range indicated above due to the permitting time an EIS involves, the changing size and commercial availability of turbine models, the model expected to best capture the wind resource, meet the interconnection requirement of 425 or 500 MW, and possible negotiation outcomes with turbine vendors. Using a larger number of smaller MW turbines or a smaller number of larger MW turbines would not change the corridors in which the turbines are located, but it would affect the amount of space between turbines. Turbine spacing would also be affected by the location of sensitive natural and cultural resources, engineering, construction, and safety constraints. The turbine size would not be expected to notably change the long-term or temporary ground disturbance for the Project; a 1.5-MW turbine would be expected to result in about 1.85 acres of temporary ground disturbance per turbine but would require 283 turbines for the proposed Project footprint (approximately 524 acres total disturbance) compared with needing 203 3.0-MW turbines with approximately 2.5 acres of temporary ground disturbance per turbine (approximately 508 acres of total disturbance). Table 2-4 lists the characteristics of representative turbines of each of the respective size classes.

Figure 2-3 Wind Turbine Schematic

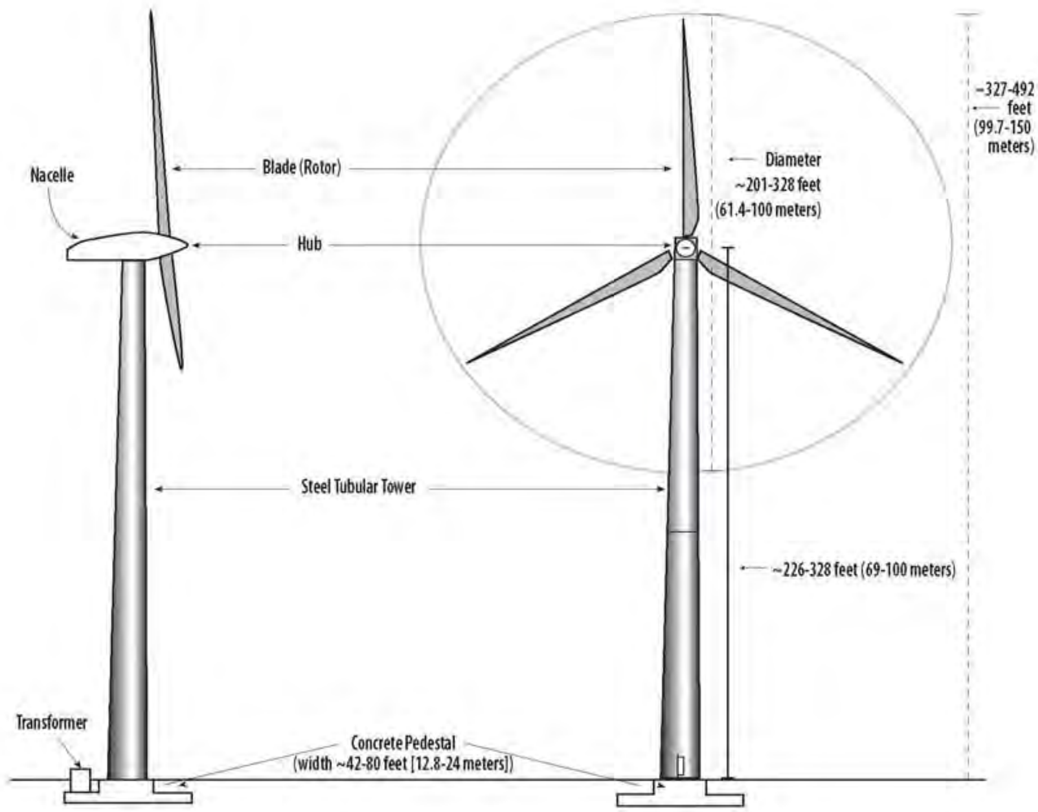


Table 2-4 Characteristics of Representative Turbine Types

Characteristic	Turbine			
	GE 1.5 MW	**Vestas 1.8 MW**	**Vestas 3.0 MW**	**Siemens 2.3 MW**
Nameplate capacity	1,500 kW	1,800 kW	3,000 kW	2,300 kW
Hub height	262 ft (80 m)	262 to 312 ft (80 to 95 m)	262 to 345 ft (80 to 105 m)	295 ft (90 m)
Rotor Diameter	256 ft (78 m)	328 ft (100 m)	295 ft (90 m)	371 ft (113 m)
Total height[1]	390 ft (119 m)	423 to 472 ft (129 to 144 m)	410 to 492 ft (125 to 150 m)	481 ft (146.5 m)
Cut-in wind speed[2]	6.7 mph (3 m/s)	8.9 mph (4 m/s)	8.9 mph (4 m/s)	8.9 mph (4 m/s)
Rated capacity wind speed[3]	26.4 mph (11.8 m/s)	26.8 mph (12 m/s)	33.6 mph (15 m/s)	26.8 mph (12/m/s)
Cut-out wind speed[4]	55 mph (25 m/s)	44.7 mph (20 m/s)	55 mph (25 m/s)	55 mph (25 m/s)
Maximum sustained wind speed[5]	Over 100 mph (45 m/s)	95 mph (42.5 m/s)	Over 95 mph (42.5 m/s)	95 mph (42.5 m/s)
Rotor speed	10.1 to 20.4 rpm	9.3 to 16.6 rpm	9.9 to 18.4 rpm	6 to 13 rpm

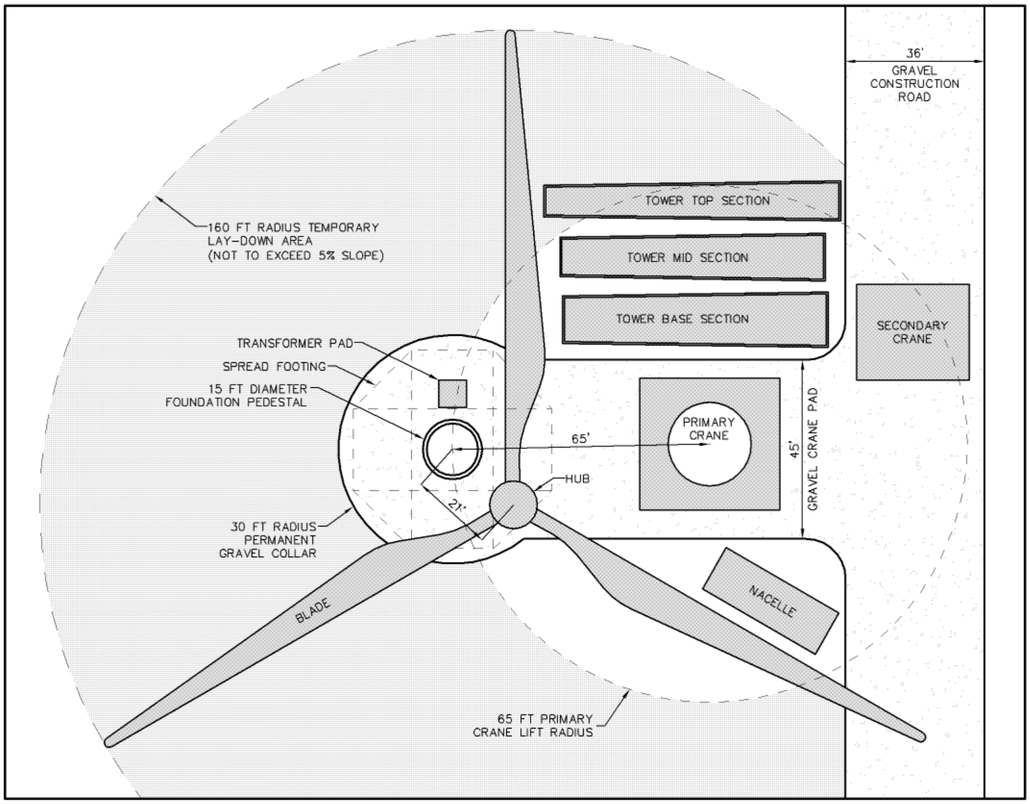
[1]Total height = the total turbine height from the ground to the tip of the blade in an upright position
[2]Cut-in wind speed = wind speed at which turbine begins operation
[3]Rated capacity wind speed = wind speed at which turbine reaches its rated capacity
[4]Cut-out wind speed = wind speed above which turbine shuts down operation
[5]Maximum sustained wind speed = wind speed up to which turbine is designed to withstand
kW = kilowatts
m = meters
mph = miles per hour
m/s = meters per second
rpm = revolutions per minute
SOURCES: Bureau of Land Management 2008c, BP Wind Energy 2011

Turbine types are not selected until shortly before construction begins. In part, the additional data collected through met towers provides a better understanding of the wind resource and the type of turbine that may be best suited to the site. However, the primary reason is that the availability of turbine types varies and not all manufacturers have the ability to provide the machines at a specified time. Some turbines being considered include the 1.8 MW Vestas turbine currently being manufactured in the vicinity of Denver, Colorado, and the 2.3 MW Siemens Turbine currently being manufactured in Hutchinson, Kansas, but other turbines may be selected as well.

The tower components for the wind turbines would be delivered by truck to the site in three or four parts, depending on the wind turbine selected. Each turbine would require approximately 7 to 16 truckloads to deliver equipment and construction materials. Whenever possible, the delivery of turbine components would be scheduled so that they can be directly installed at each location, reducing the need for intermediate storage on site. When the trucks arrive at each site, the assist crane would remove the cargo and position it according to the predetermined lay-down configuration. Each turbine site would have a plan for the arrangement of major components before erection. Figure 2-4 provides an example of the construction layout for component staging and assembly. The typical temporary disturbance area for staging and assembly of the wind turbine is about 1.85 to 2.5 acres, with an area of about 0.065 acre per turbine of permanent disturbance for the life of a project. Site preparation and pre-construction activities are addressed in Section 2.5.1.

In the absence of any sensitive natural or cultural resources, engineering, construction or safety constraints, ideally wind turbines are positioned about three rotor widths (about 1,000 feet) apart from one another and each row of turbines is about 10 rotor diameters from the next row (about 0.5 mile) so that the wind energy can reconstitute to maximum power after passing through each row of turbines. As described in BLM IM 2009-043 for safety reasons, no turbine on public land would be positioned closer than 1.5 times the total height of the wind turbine to the ROW boundary (BLM 2008a). Based on the proposed range of total turbine heights, this equates to a safety setback of 585 to 738 feet from the ROW boundary. There are also setbacks that would be applicable if the Project were being built adjacent to an existing wind farm; in general, the BLM Wind Energy Policy (IM 2009-043) would require that no turbine be positioned closer than five rotor-diameters from the center of the wind turbine to the ROW boundary. However, this setback rule would not apply to this Project because there are no wind farms adjacent to the application area.

Figure 2-4 Wind Turbine Generator Component Staging and Assembly



The wind turbines are equipped with sensors that monitor wind speed and direction. While the turbine blades may spin freely in low wind speeds at very slow revolutions per minute (less than operation), the turbine generators produce electricity when the wind reaches a pre-determined wind speed that can sustain the rotational movement. The turbines rotate to face the prevailing wind to maximize energy production. At around 30 mph, the turbines reach their maximum power output, which is between 1.5 to 3.0 MW, depending on the final turbine selection. In stronger winds, the turbines start to pitch out of the wind (which means the turbine blades may shift in rotation to capture less energy or what is known as "feathering") and at a pre-determined cut-out wind speed, the turbines shut down to limit the amount of stresses on the turbine.

Each wind turbine generator contains approximately 50 gallons of glycol-water mix, 85 gallons of hydraulic oil, and 105 gallons of lubricating oil located in the nacelle. Leak detection and containment systems have been engineered into the design of the wind turbine generators and are addressed in the SPCC Plan. As a result, potential for accidental spills resulting from malfunction or breach of the generators is low.

Each wind turbine also contains a safety system that ensures automatic shutdown of the turbine in the event of any mechanical disorders, excessive vibration, grid electrical faults, or loss of grid power. If grid electrical faults or loss of grid power occurs, the turbines would automatically be brought back to service when the disorder has been remedied. For mechanical disorders, the turbines would remain shut down until the cause of the disorder has been identified and resolved by the Project O&M team. Additionally, the construction of each turbine base would include a buried copper cable grounding mat to discharge electric energy into the earth when the wind turbine builds up an electrical charge through turbine operation, by being struck by lightning, or by equipment malfunction.

Because the turbines would exceed heights of 200 feet above ground level, the turbines would be marked or lighted per Federal Aviation Administration (FAA) Guidelines (FAA 2007). This would possibly entail placing red strobe lights on the nacelle of selected turbines to adequately warn aircraft pilots of the obstructions at night.

When turbines are painted bright white or light off-white, FAA night-time lighting requirements include the use of red, simultaneously flashing lights positioned on the outer perimeter of the wind turbine farm, each spaced no more than 0.5 statute mile from each other. The FAA determines which turbines would require nighttime lights, but it is anticipated that about half of the turbines would be marked by red strobe lights, particularly the turbines closest to the Project boundary or on high terrain.

The intensity of the nighttime flashing red lights is approximately 2,000 candelas (a measure of the intensity of light—roughly equivalent to a 1,666-watt bulb) and they flash about 22 times per minute with a flash duration between 100 and 2000 milliseconds. The lighting would be similar in appearance to a series of cell phone towers. The lights are designed to flash in unison and to concentrate the beam in the horizontal plane, thus minimizing light diffusion down to the ground.

FAA is in the process of updating of rewriting the FAA Obstruction Lighting Advisory Circular AC 70-7460-1K to provide more clear guidance and better consistency in turbine visibility rules. It is anticipated that the new guidance will indicate that white or off-white paint on wind turbines has been shown to be the most effective method for providing daytime conspicuity. The preferred white paint color for wind turbines is RAL 9010 or equivalent. The darkest acceptable off-white paint color for wind turbines is RAL 7035 ("light grey" on the RAL standardized color chart) or equivalent. FAA is no longer including provisions to allow for dark paint colors and white strobe lights to be used for daytime marking/lighting, as had been allowed at the time the Draft EIS was prepared (Patterson 2012).

2.5.2.4 Foundations and Pad Mounted Transformers

The wind turbine base foundation anchors the turbine structure securely to the ground due to its size, weight, and configuration. The most common foundation design used for wind turbine installations within the United States is the mat foundation, which is proposed for this Project. A mat foundation is generally an octagon shape with dimensions ranging from 50 to 60 feet wide and 8 to 10 feet deep. A concrete pier on the top of the mat extends to the ground level. Foundations would be designed for ease of removal during decommissioning. Typically, the amount of soil material excavated for a mat foundation ranges between 655 to 1,045 cubic yards; the excavated soil is not all waste material because some of the soil is used to backfill over the concrete foundation. The amount of concrete material needed to construct a typical foundation is approximately 375 cubic yards, but could be as much as 600 cubic yards depending on the turbine selection (refer to Section 2.5.2.2 for more on the temporary concrete batch plant). Rebar is used for structural support with about two to three truckloads of steel (20 to 35 tons) used per turbine site.

Figure 2-5 shows a turbine foundation under construction. After the concrete has cured for about 30 days, the excavated soil is backfilled so that only the concrete pier on top of the mat remains visible. Topsoil would be reserved for rehabilitation and other excess soil from construction activities would be used where needed to achieve an appropriate grade for roads, to supplement the existing sub-base of roads, and/or to blend the road into the surroundings grades by widening curves and improving road prisms[5], as appropriate.

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[5] The area of the ground containing the road surface, cut slope, and fill slope.

Figure 2-5 Typical Pouring of Turbine Foundation

Power from the turbines would be fed through insulated electric cables (meeting state/Federal standards) and a breaker panel at the turbine base inside the tower would be interconnected to a pad-mounted step-up transformer (see Figure 2-6). This 34.5-kV transformer is approximately 6 feet long by 6 feet wide and 6 feet high, and is placed adjacent to the concrete pier of each new turbine foundation to step up the voltage from the wind turbine (typically around 690 volts) to a capacity of 34.5 kV direct current, which is the voltage carried on the electrical collection system. The transformer foundation would be an approximately 6 foot-by-6-foot concrete pad placed over compacted soil or granular material. Each pad-mounted transformer would contain approximately 500 gallons of mineral oil used to cool the electrical components located within the box. Leak detection and containment systems have been engineered into the design of these transformers. As a result, potential for accidental spills resulting from malfunction or breach of the transformers is low, as addressed in the SPCC Plan.

Figure 2-6 Typical Pad-Mounted Transformer

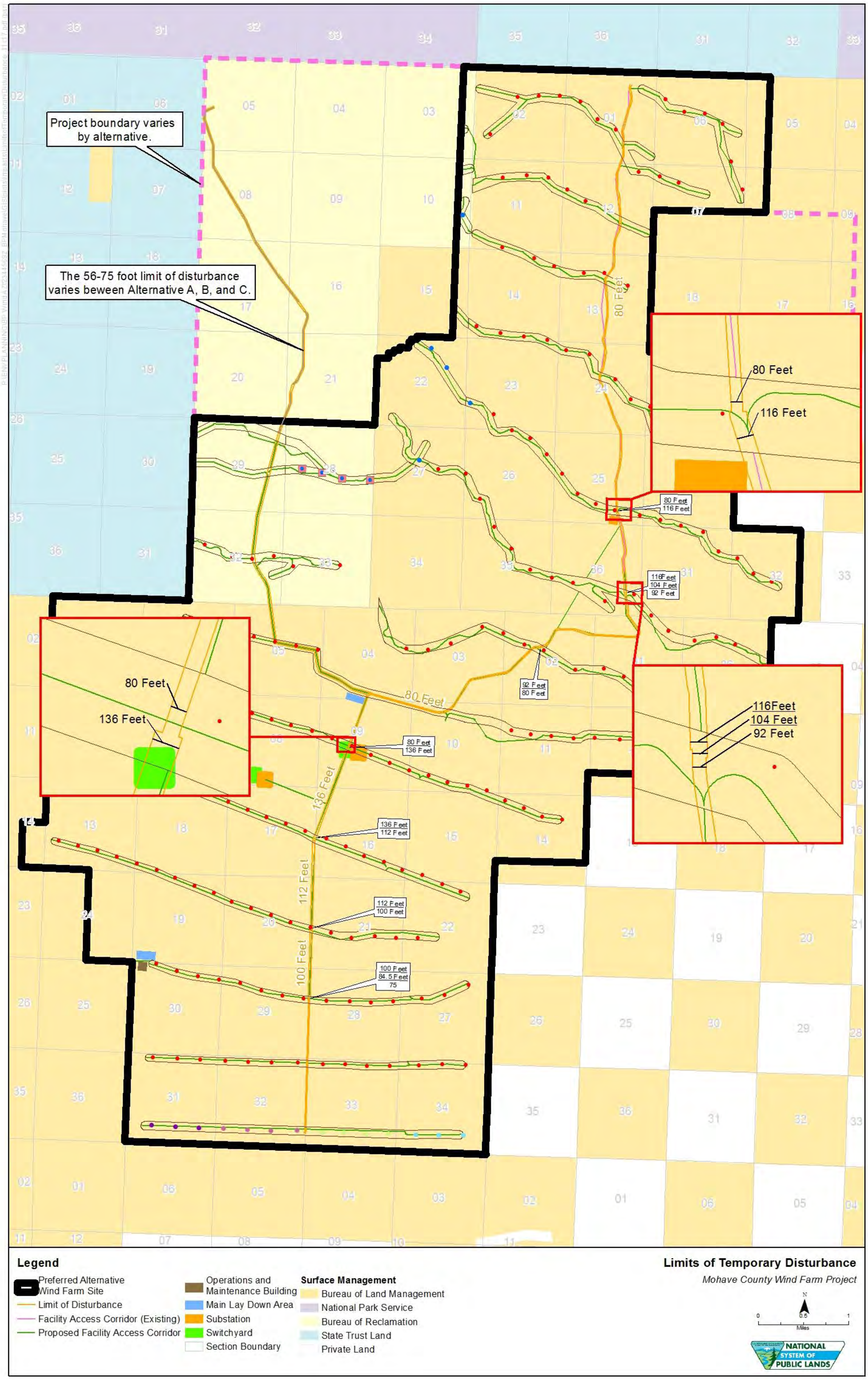
2.5.2.5 Electrical Collection System and Communications

A power collection system would collect the energy generated by each wind turbine (increased in voltage through the pad-mounted transformer) and transmit the power to an electrical substation via 34.5-kV electric cables. Three cables, one for each electrical phase, plus a communication and ground cable would be buried in a trench in a manner that minimizes disturbance by putting the trench within the temporary interior road area that is wide enough to handle the large transport vehicles hauling turbine components and the cranes used to assemble the turbines. Using a backhoe, the trench would be dug 3 or more feet deep and approximately 2 feet wide (see Figure 2-7). In some locations, multiple sets of cables could be installed in a joint trench or in a series of side-by-side trenches to consolidate the cables from multiple corridors of turbines.

Figure 2-7 Typical Trench for Electrical Collection Cables

Once the collection system has connected approximately 25 MW nameplate of wind turbines together, called a circuit, it would transmit the electrical energy in that common set of cables to its point of termination in the electrical substation. Once the circuits enter the common collector road, they would run in parallel to each other offset by approximately 10 feet to accommodate dissipation of heat, installation requirements, and possible future maintenance. Figure 2-8 depicts the stair step increase in width to accommodate the circuits as they get closer to the substation. The width of the disturbance limits varies from 56 to 136 feet on BLM-administered lands and from 56 to 75 feet on Reclamation-administered lands depending upon the number circuits from the turbine strings. On Reclamation-administered lands, the limits of disturbance for the collector lines under Alternatives A and C would be 56 to 75 feet, however under Alternatives B and E, the limit of disturbance would be 56 feet.

Figure 2-8 Temporary Surface Disturbance Limits



As part of the Plan of Development, trenching plans would be developed in cooperation with BLM and Reclamation, with input from appropriate regulatory agencies, to minimize the environmental effects that may occur with open trenches. This may include timing trenching to avoid leaving trenches open when heavy precipitation is anticipated, using wooden planks to establish wildlife escape ramps, and inspecting trenches left open overnight for animals that need to be removed prior to backfilling.

While collector lines connecting turbines within a row would typically be placed underground, the collector lines leading to the substation may be constructed aboveground on structures to span terrain and environmentally and culturally sensitive areas (see Figure 2-9). When used, aboveground 34.5-kV monopole structures would generally be approximately 35 to 65 feet tall if less than two circuits per pole, direct embedded in the ground without concrete footings, and support three wires (one for each electrical phase). It is possible that there would be two circuits (six wires) on one set of structures, plus a fiber optical ground wire line at the top of the structure. The overhead collection line would have a span of about 250 feet and generally resemble a power distribution line. The aboveground facilities would be built to Avian Power Line Interaction Committee standards to minimize potential impacts to raptors and other birds. If collector lines are placed aboveground adjacent to the access roads, physical ground disturbance would generally be limited to the pole installation site where an auger would be used to dig the hole for the support structure, although vegetation clearing along the access roads would be required for access to the pole sites. Structures would be grounded by installing grounding rods.

A Supervisory Control and Data Acquisition (SCADA) system would network underground fiber optic cables within the Wind Farm Site to allow for remote control monitoring of the turbines and communication between the wind turbines and the substation. The network of cables would be buried in the same trenches as the electrical collection system cables to minimize the impact to the environment. BP Wind Energy maintains a 24-hour-per-day, 7-days-per-week Remote Operations Center in Houston, Texas where each of the turbines and ancillary equipment can be monitored for faults, in addition to the monitoring available at the O&M building that would be staffed during business hours. All authorized personnel would be able to remotely operate the turbines.

Figure 2-9 Typical Structures for Aboveground Collector Lines

2.5.2.6 Electrical Distribution Substations

The energy generated by the turbines would be delivered via the electrical collector system to two new substations (either 345 kV or 500 kV), where transformers would further increase the voltage so that generated power can be transmitted via a high-voltage transmission line to the grid (see Figure 2-10). The single transmission line would connect the two substations and then would tie into the interconnection switchyard. The proposed switchyard is further discussed in Section 2.5.2.7.

Figure 2-10 Typical Substation

The locations of the proposed substations would be strategically selected in an effort to avoid environmentally and culturally sensitive areas. The facilities would be established in areas that are relatively flat, near the site access point, adjacent to a proposed interior road, and central to the proposed turbine sites. As shown in Map 2-1, one proposed substation location is in Section 25, Township 29 North, Range 20 West. The second substation is proposed to be located near the switchyard. One switchyard location has been identified for each transmission line being considered. If a 345-kV switchyard is built, the location would be in Section 8 of Township 28 North, Range 20 West. If a 500-kV switchyard is built, the location would be in Section 9 of Township 28 North, Range 20 West. Two locations are proposed for the switchyard because the two transmission lines are in parallel ROWs and the switchyard should be located such that BP Wind Energy can avoid crossing one line to get to the other as a point of interconnection. Accordingly, a switchyard site has been selected on both the north side and south side of the parallel lines, and evaluated for potential environmental impacts.

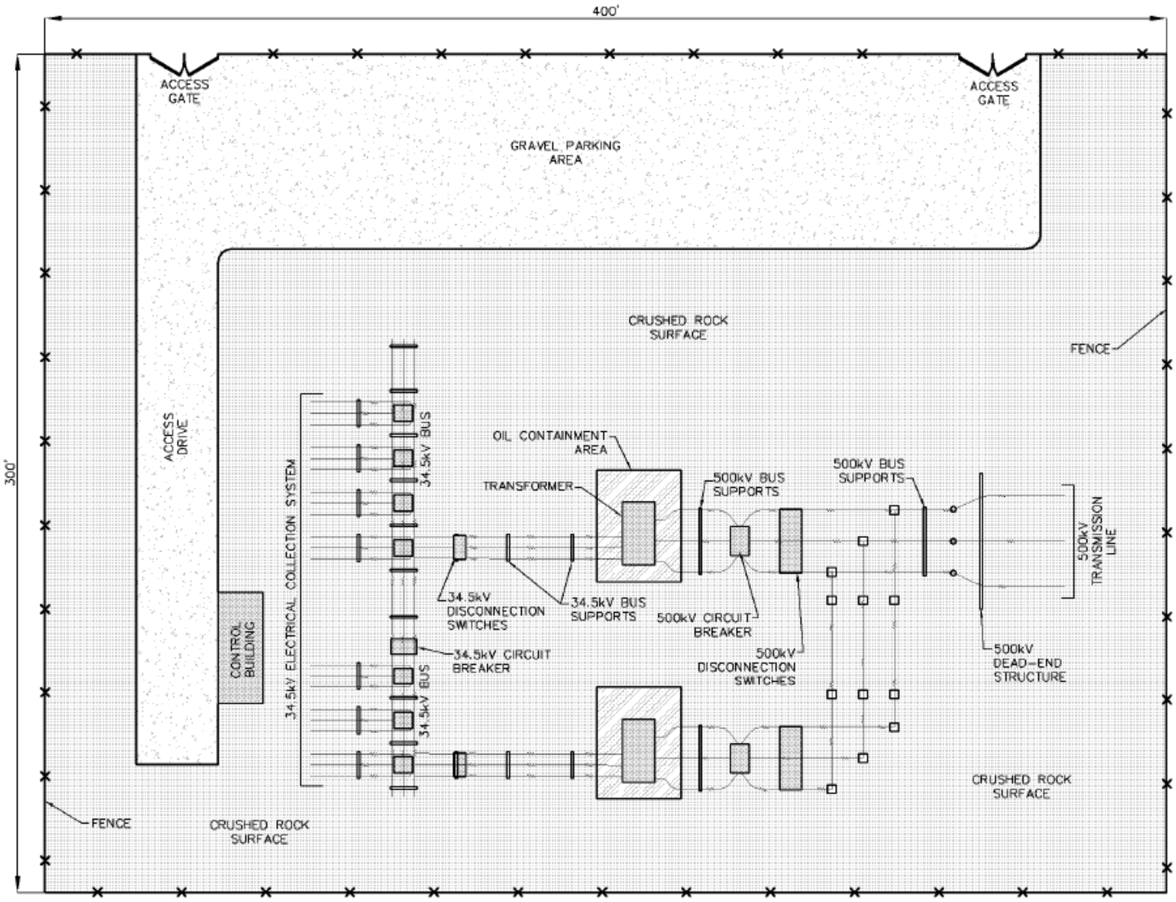
Substation components (such as the buswork, transformers, breakers, control building, etc.) would typically have a maximum of height of around 35 feet with conductive components having uncovered, nonspecular[6] metal surfaces. The lightning protection masts (and potentially shield wires) would have heights closer to 75 feet. In addition, the slack span of the transmission line entering the substations would gradually rise to the height of the transmission line leaving the substations.

The two oil-filled transformers (see Figure 2-11) in the substations would each contain approximately 12,000 gallons of mineral oil for cooling and have a specifically designed containment system to

[6] Specular is the mirror-like reflection of light from a surface, in which light from a single incoming direction is reflected into a single outgoing direction. A nonspecular surface would diffuse the reflected light.

minimize the risk of accidental fluid leak and discharges to the environment, as addressed in the SPCC Plan. No polychlorinated biphenyls (PCBs) would be used in transformers on this Project.

Figure 2-11 Typical Substation Facility Layout



Site preparation for the substations is addressed in Section 2.5.1 and would be limited to approximately 5 acres per substation, include a copper grounding grid laid below grade in trenches around the substation site to protect equipment and personnel in the case of electrical malfunction or lightning strike. The grounding grid is typically at a depth of about 2 feet; it may be located deeper, but would not be at depths of more than 5 feet below ground level. The substation facilities would be graveled with approximately 500 cubic yards of crushed rock, and include a parking area. A small control building painted a neutral color with muted tones to blend with the environment would be located within the substation sites for electrical metering equipment. The substations would be surrounded by an 8-foot-high chain-link fence capped with three strands of barbed wire for security (see Section 2.5.2.11). The approximate dimensions of the fenced areas are anticipated to be 300 feet by 400 feet, although up to 5 acres for each substation site could be fenced.

Project limits of the substations and switchyard would be staked and flagged in accordance with the flagging plans (identified in the Plan of Development) to limit the area of disturbance. Following vegetation salvaging, staking, clearing, and removing and stockpiling the top 4 inches of available top soil material of the substation site, soil erosion control measures (which may include grading to avoid steep slopes, check dams, diversion dikes, silt fences, straw or hay bales, minimizing disturbance by staking the construction area, etc.) would be implemented in accordance with the required SWPPP. Both the substations and the switchyard at the interconnection point (discussed in Section 2.5.2.7) would be graded flat and compacted as needed to allow uniformity in foundation elevations and structure heights. Site work would include using a backhoe to excavate for foundations and dig trenches for below-grade conduit and other features, installing the grounding mat, and pouring foundations and slabs using concrete hauled from the batch plant. Foundation depths for the control building and equipment within the substation would vary based on the requirements of the detailed design, but trenches dug for the foundations of major equipment would typically be in the range of 5 to 8 feet deep. Foundations would be designed for ease of removal during decommissioning. Vertical steel support structures would be erected and electrical equipment would be installed. General components would include power transformers, circuit breakers, switchgear, voltage regulators, capacitors, air switches, arresters, and various monitoring instruments/equipment. Finally, the perimeter fence and the final layer of crushed rock surfacing would be installed, possibly with an underlayment to help prevent weeds and include spill containment where appropriate. If needed, substation and switchyard maintenance to control weeds may include cultural, physical, biological, and/or chemical control methods, as approved by the BLM, and in accordance with the Integrated Reclamation Plan.

2.5.2.7 Overhead Transmission Line and Interconnection Switchyard

An overhead transmission line would carry the power from substation to substation to a new Western switchyard where the power is transferred to the electrical power grid. Similar to the substation described in Section 2.2.6, the switchyard facility would be a graveled and fenced area up to 11 acres, with a parking area and electrical devices such as circuit breakers and air switches. Because switchyards do not change system voltage from one level to another, they do not have transformers on site; therefore, there is no risk of a leaking transformer and spill containment may be needed if oil-filled breakers are used. A relatively short microwave tower within the switchyard would provide communications to an existing line-of-site microwave tower located miles away. The telecommunications line to the O&M building would be extended to the switchyard to provide a redundant means of communication with the switchyard. System studies determine the appropriate location for the interconnection with an existing transmission lines. The transmission line and the switchyard would be the same voltage as the power line to which it interconnects (that is, either 345 kV or 500 kV).

The structures proposed for the majority of the transmission line would be steel or concrete monopole structures that are of a color suitable for the environment. The structures would be approximately 115 to 150 feet tall and span approximately 800 to 1,000 feet (see Figure 2-12 for typical overhead transmission line structure examples). The depth and diameter of holes dug for the transmission poles foundations would depend on factors determined during detailed engineering, including geotechnical conditions and soil bearing capacity, but for this voltage would typically be about 20 feet in depth and about 3 feet in diameter. Excavated soil material would be used for backfill, and any excess material scattered in the area around the structures/poles. The poles generally would support three conductor phases and a ground wire.

Figure 2-12 Typical Overhead Transmission Line Structures

A 150- to 250-foot-wide corridor is generally required along the entire length of the transmission line route for structure installation, stringing purposes and to meet safety requirements. However, due to the characteristically low-growing plant species present, vegetation clearance for the proposed transmission line would be minimal, along approved profiles, and removed in accordance with approved BLM guidelines. It is anticipated vegetation would be removed only for the access to the transmission line corridor and for a small areas around transmission line structure sites. Decisions regarding the quantity and height of the vegetation that needs to be removed would be in accordance with approved Plan of Development guidelines and a surveyor would stake the clearance limits in accordance with the Plan of Development flagging plans to help ensure the vegetation removal is minimized to that required for safe construction.

A road would be established along the entire length of the proposed transmission line for access. Construction access would consist of an at-grade, 20-foot-wide road, which would be retained for permanent operation and maintenance of the line upon completion of transmission line construction. Existing roads would be utilized when available to reduce potential impacts associated with the construction of a new road.

Materials and other components for the transmission line would be transported to the Project Area via tractor and semi-trailer and would be staged and assembled (if necessary) at the Project's main laydown/staging area. At the commencement of construction, material and components would be transported, as needed, from the staging area to the construction site. Foundations would be excavated by means of excavating equipment, and may require blasting to loosen the earth and rock. Excavated material would be crushed and used as backfill with excess fill spread around the site. The foundations may include a 20- to 30-foot steel rebar cage with mounting plate and anchor bolts that would be placed in the augured hole and backfilled with concrete transported from one of the temporary batch plants to the construction sites via truck. Transmission line poles would be lifted into place using a telescoping boom crane onto the cured foundations and bolted down with pneumatic wrenches. A grounding crew would follow behind the pole assembly and erection crew installing the transmission line pole ground rods.

Ground resistance would be measured; if the proper ground resistance is not initially achieved, additional ground rods would be installed until the acceptable ground resistance is obtained. Following placement of the poles, a guide wire would be used to string the conductors between the poles. The conductor line, which is approximately 1.0- to 1.5-inches in diameter and nonspecular to minimize reflections, is generally strung in sections (from point of intersection to point of intersection) and then tensioned at those same locations. For stringing a line of this type, most of the work would likely be done using truck mounted equipment; however, the contractor may elect to use helicopters for portions or all of the work.

Until all system studies are completed and negotiations for a power purchase agreement are further advanced to know which transmission line would best serve the power purchaser, the precise location of the interconnection switchyard cannot be determined. However, the general locations that are being studied for the switchyard are included on the maps in this chapter. One switchyard location has been identified for each transmission line being considered. If a 345-kVswitchyard is built, the location would be in Section 8 of Township 28 North, Range 20 West. If a 500-kV switchyard is built, the location would be in Section 9 of Township 28 North, Range 20 West. Construction of the switchyard would generally be as described above for the substation, although the switchyard would not contain transformers so foundations could be less robust and oil spill protection features would not be required. The size of the switchyard would depend on whether the interconnection is to a 345-kV or 500-kV transmission line. The switchyard for a 345-kV interconnection would require approximately 11 acres for construction with the finished switchyard within an approximately 600-foot by 600-foot fenced area. The switchyard for a 500-kV interconnection would require about 18 acres for construction with the finished switchyard fenced within an approximately 650-foot by 750-foot area. The length of transmission line to the switchyard would depend on the switchyard location, but would range from about 650 feet to 6 miles.

2.5.2.8 Transformer Replacement at Mead Substation

Depending upon the interconnection option selected, power system upgrades could be required. Under Western’s Tariff, if interconnection requests result in the need for system upgrades to accommodate the additional power, the interconnecting party needs to finance any required upgrades. If the 345-kV interconnection is pursued, power system impact studies show that the additional power from Project generation would, under certain conditions, overload the existing 345/230-kV transformer at the Mead Substation at the end of the Liberty-Mead 345-kV transmission line.

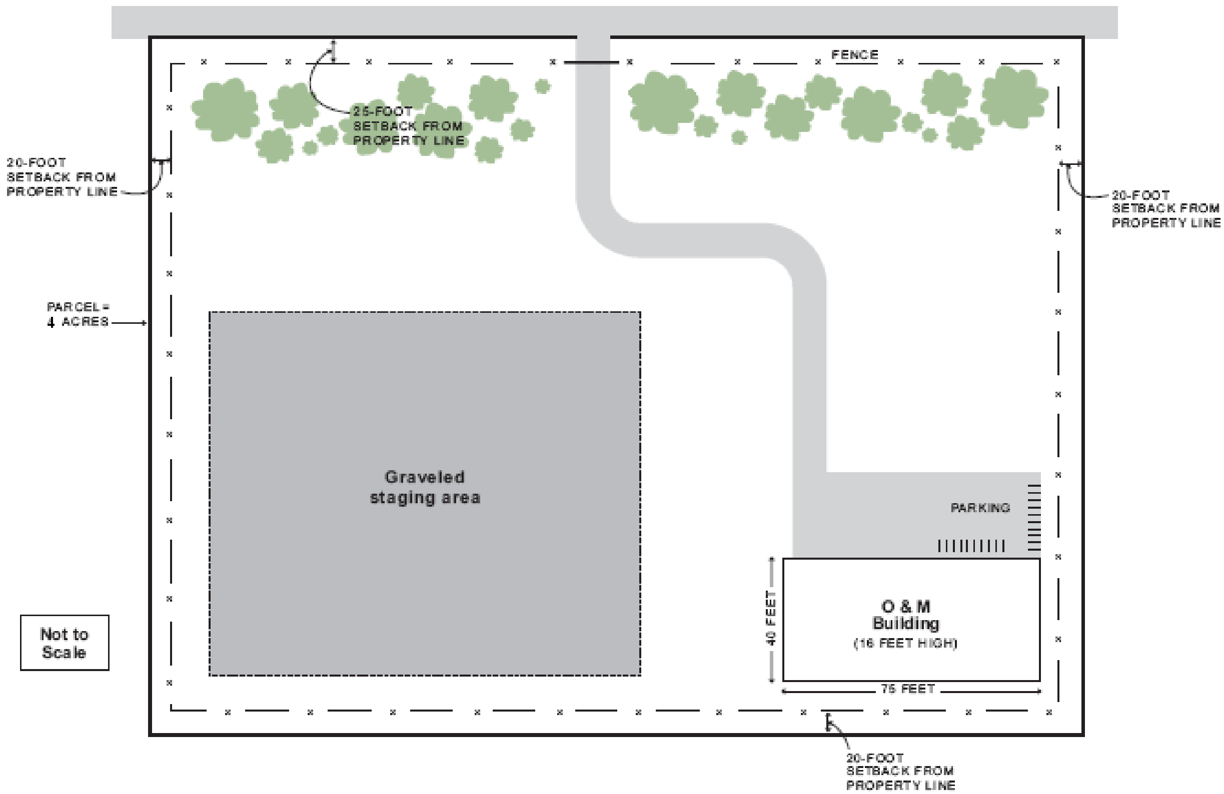
To resolve this overloading issue and maintain system reliability, Western would replace the existing transformer and its associated breakers and switches with two new 345/230-kV transformers and new breakers and switches. This work would all be accomplished within Western’s existing Mead Substation located in the El Dorado Valley about 3 miles south of Boulder City, Nevada. Mead Substation is a relatively large Western substation originally constructed by Reclamation in 1967 and expanded several times since that date. The facility was transferred to Western in 1977 when the Department of Energy was created. The work would be confined to the previously developed and disturbed area within substation; no additional area would need to be disturbed. Existing concrete foundations and/or pads may need to be removed, and new ones constructed. The substation is an industrial area that has been graded and covered with a layer of aggregate, and is kept vegetation free. Mead Substation already contains equipment similar to what would be replaced and added, and a large number of transmission lines enter and exit the facility.

Western would operate and maintain the new transformer and related equipment as it currently does the existing equipment. Should the proposed Project be decommissioned, the equipment at Mead Substation would be kept in service as part of the normal operation of the Liberty-Mead transmission line and the rest of the power system.

2.5.2.9 Operations and Maintenance Building

The O&M building would be used to store equipment and supplies required for operations and maintenance of the wind farm, house control functions such as the SCADA used to provide two-way communication with each wind turbine, and provide a facility where O&M personnel can prepare documentation of work done on wind farm facilities. The O&M building would be located within an up to 5-acre fenced area that also includes a graveled parking lot (see Figure 2-13).

Figure 2-13 Typical O&M Facility Layout



The O&M building would be a composite panel steel building, approximately 60-feet by 100-feet in size and approximately 16-feet high, with the roof and side panels painted a color to blend with the environment. The telecommunications and electrical services for the O&M building would be from local providers, or electrical power possibly could be supported by a rooftop solar system and battery backup. If the proposed distribution line to support batch plant operations is established, the power would be extended to the O&M building for the operations and maintenance stage. Telecommunication and/or data lines would be installed on the distribution line support structures to the O&M building unless BLM prefers that communication lines be buried. External lighting would be minimal with downward directed lighting. The surrounding chain-link fence would be 8 feet high and topped with barbed wire (refer to Section 2.5.2.12); a roll-away gate within the fence would be operated by O&M personnel.

A well may be permitted by ADWR and constructed at the O&M building location at the start of construction to provide water for the southern laydown yard, batch plant operations, dust control and miscellaneous needs to reduce the transportation of water from the Detrital Wash wells. The capacity and viability of this well at the O&M building would be determined during final engineering. The well would replace or reduce the demand on the existing Detrital Wash wells. The well would have the capacity to supply the O&M building after construction with a pumping rate of 10- to 15-gallons per minute (similar to a residential well) and would be utilized to provide potable water to the O&M building for domestic water supplies. The depth of the well is difficult to forecast; while the well may be as deep as 1,200 feet, this depth is not anticipated. All necessary entitlements and permits would be acquired prior to construction and permit requirements would be followed during construction. The desired capacity of the well would be to deliver similar quantities as outlined in Table 2-3 during construction and then up to 5,000 gallons per day, but a lesser capacity would be adequate because actual water use during operations is expected to be about 100 gallons per day (or 36,500 gallons per year, and 912,500 gallons over the life of the Project). If water use were as much as 5,000 gallons per day (a typically limit for residential wells), this conservative amount would equate to a maximum of up to 1.825 million gallons of water per year, and 45.625 million gallons over the life of the Project. Pending any other guidance from BLM, after decommissioning the Project, the well would be capped below ground level, with the ground above the cap refilled.

Similarly, a septic system comparable in capacity and design to a residential system would be installed for the O&M building in accordance with applicable permits.

Limited quantities of lubricants, cleaners, and detergents would be stored near and within the O&M building, including a minimum of two 55-gallon drums of oil for continuing maintenance of the wind turbines. Waste fluids would be stored in accordance with applicable regulations at the O&M building for short periods of time during Project operations. BMPs incorporated into the design of the O&M facility, including containment areas and warning signs, would minimize the risk of accidental spill or release of hazardous materials at the facility. No risk to health and safety or the environment is anticipated. No fuel would be stored on site, as described in the SPCC Plan.

During morning briefings and at various times during the day, approximately 30 employees could be using the O&M building. The O&M building would be staffed during typical business hours, although there may be occasions when employees would work on weekends as well. Because turbines can be operated from the Remote Operations Center in Houston, Texas, there is no need to have personnel on site 24 hours per day.

Site preparation for the O&M building would include surveying, staking, clearing, and grading, as described in Section 2.5.1. Excess excavated soils would be used as fill for roads or other related Project needs. The drainage plan would be designed in accordance with BMPs and the required SWPPP. An approximately 1- to 3-foot-wide concrete-filled trench would provide a foundation for the 60-foot by 100-foot composite panel building, and beams would be put in place to form the floor. The panel building would be erected on the foundation. Telecommunications and electrical lines would also be connected to the building.

The O&M building would be located near the location where the primary access road enters the Wind Farm Site along the Section 19/20 line in Township 28 North, Range 20 West.

2.5.2.10 Access Roads

As shown in Map 2-1, access to the Wind Farm Site from US 93 is an extension of a road leading to the Materials Source along Detrital Wash, which was used during road construction along US 93 (located approximately 6.5 miles northwest of White Hills Road). The distance from US 93 to the Wind Farm Site would be about 3 miles. This primary access route would be upgraded to be 30- to 40-feet wide (plus a drainage area on each side) to accommodate the oversized vehicles for equipment and the cranes needed for construction. Improvements to US 93 (such as a turn lane or widened shoulders) that may be required would be coordinated with the Arizona Department of Transportation (ADOT) and developed in accordance with the department's permitting process.

Interior roads within the Wind Farm Site would consist of both new roads and upgrades to existing 2-track roads. Approximately 68 to 83 miles of new road would be constructed and approximately 5 to 7 miles of existing roads would be improved on BLM-administered public lands, and approximately 9 to 21 miles of new roads would be constructed on Reclamation-administered lands, depending on the alternative selected. Interior roads would connect the wind turbines, substations, switchyard, and O&M facility.

During construction, the temporary disturbance width for the turbine corridor roads would generally be 36 feet, but could be up to 56 feet. This includes the 36-foot-wide construction-phase road (16-foot wide road with 10-foot wide shoulders) and up to 10 additional feet on both sides of the road being cleared or graded where needed to accommodate corners, grade changes, and drainage. The temporary construction disturbance width for the roads connecting the turbine corridor roads would also be similarly designed, but would require up to a temporary disturbance width of 75 to 136 feet to accommodate the collector lines that would be installed parallel to the roads. The disturbance along the connecting roads would stair step in size as multiple collection lines are routed in parallel heading into the substations as depicted in Figure 2-8. The wider temporary construction area would accommodate additional trenches for the collector lines as cables from multiple turbines run in parallel together. Site preparation and pre-construction activities are addressed in Section 2.5.1. The limits of new and improved roads would be marked by flagging or survey stakes to prevent unnecessary disturbance, as addressed in the Flagging Plan included in the Plan of Development. Existing resource roads would be utilized as much as possible to reduce potential impacts associated with the construction of a new road.

Road specifications would be determined during final engineering design. Each turbine manufacturer has different road design requirements that address design elements such as maximum grade and minimal turning radius at corners. Once a turbine manufacturer is selected, the Transportation Plan, Appendix C.2.8 – Transportation and Traffic Plan would be modified to describe the transport of large equipment, considering the specific object sizes, weights, origin, destination, and unique handling requirements. The transportation plan also would include traffic control measures (such as informational signs, flaggers when equipment may result in blocked throughways, and the use of traffic cones) to ensure that no additional hazards would result from increased truck traffic and that traffic flow would not be adversely impacted. The transportation plan, as well as engineering design and plan sheets for the roadways (in the Site and Grading Plan), would be submitted to BLM and Reclamation for approval before the agencies issue a notice to proceed with construction. The transportation plan also would be submitted to ADOT for review and approval. A field review with proposed routes marked with lath and flagging, as described in the Plan of Development, would be completed to help ensure roadway design does not compromise the safety of the traveling public or sensitive environmental and cultural resources.

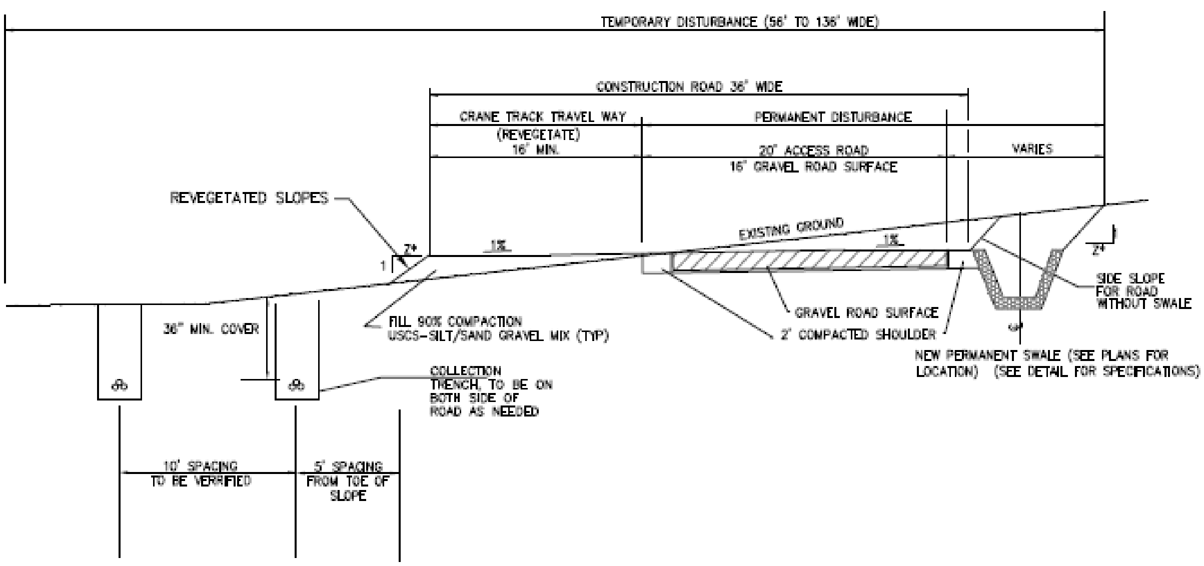
Temporary construction roads would generally consist of 6 to 12 inches of gravel base over compacted native sub-base material. A geogrid, geotextile material or other stabilization methods may be used in areas of poor subgrade soils as soil reinforcement and/or to reduce the gravel base thickness requirement.

Along the proposed roadway path, the highpoints would be pushed into the low points to minimize overall cut and fill required. This is needed to establish roads with an appropriate grade (typically not exceeding 9 percent, but certain roads could be steeper if within BLM construction standards, i.e., BLM Manual Section 9113) for transporting the equipment within the Project Area. Crossings at low spots or drainage courses would be at-grade with no culverts or extensive fill, unless needed due to threat of a wash out. Any material used to upgrade roads would be compacted to 80 percent or greater as required for soil stability using a typical roller to a compaction proof roll of 25 ton axle weight. Intersections between the main access road through the Project Area and the access to the rows of turbines would be widened to provide a turning radius of 130 to 150 feet to allow trucks and tractor semi-trailers to maneuver into and out of the construction area.

During site operations, roads would be inspected monthly and after heavy rain fall. Periodic grading and placement of gravel would potentially be required to maintain road quality. Gravel would be obtained from stockpiled gravel after construction is complete or from a permitted offsite source during operation. To minimize airborne dust, road maintenance would be scheduled during times of low or no wind, and would be suspended when wind speeds exceed 22 mph, based on available meteorological data. A third-party compliance inspector would coordinate with BLM and/or Reclamation to review maintenance activities occurring onsite, and to halt those activities should non-compliance be observed. Speed limits of 25 mph would be posted and required of all operation and maintenance personnel and enforced by site management to minimize airborne dust and erosion of roads. In general, water would be used to control dust, but palliatives that are pre-approved by BLM and/or Reclamation may be used in high traffic or controlled areas.

As discussed in Section 2.5.3 regarding post-construction activities, following the completion of wind turbine construction, the construction road width of 36 feet would be reduced to a 16-foot service road with 2-foot shoulders on either side for a total width of 20 feet (see Figure 2-14). These 20-foot-wide corridors would represent the long-term disturbance for new interior roads in the Project site. Long-term turnaround areas, encompassing approximately 2 acres each for a 200-foot-wide turnaround of 30 feet in width, would be positioned at the end of each turbine row.

Figure 2-14 Typical Access Road Cross Sections



A 20-foot-wide road for construction also would be established to allow access along the length of the proposed transmission line. This access would consist of an at-grade road that would be restored, in accordance with BMPs, to reduce the road to a 20-foot width for long-term operation and maintenance of the line upon completion of transmission line construction.

2.5.2.11 Meteorological Towers

Thirteen temporary meteorological wind monitoring towers (met towers, see Figure 2-15) equipped with sensors to measure wind speed and direction, temperature, and pressure have been constructed within the Project Area boundary to collect data to determine the wind resources available at the site (see Map 2-1 for existing and proposed met tower locations). Wind data have been recorded at various heights up to 197 feet on the temporary meteorological towers. SODAR (SOnic Detection And Ranging), a meteorological instrument used to measure the scattering of sound waves by atmospheric turbulence, has been deployed on site. SODAR systems measure wind speed at various heights above the ground, and the thermodynamic structure of the lower layer of the atmosphere. Separate NEPA documentation was prepared prior to the construction of the temporary met towers and installation of the SODAR unit. To verify production performance of the selected turbine, power curve testing (to graph how much power—in watts or kilowatts—a wind turbine will produce at any given wind speed) may be necessary, which would require the construction of an additional 10 temporary met towers. The met towers used for power curve testing may be installed as early as 3 to 6 months prior to construction. These temporary met towers would be approximately 262 to 295 feet in height and have a guy-wire system for support; the BLM would require avian species diverters on the met towers guy-wire system. Wind data would be collected up to the turbine hub height on these met towers. The towers would temporarily require up to 1.6 acres (per tower) for installation and placement of the guying system, and leave no permanent disturbance. Most met towers used for power curve testing would be expected to be within the turbine corridors and accessible by the Project's interior roads, but there is the potential need for placing a met tower outside of a corridor, which would require new access. The access routes would be approximately 20 feet wide to accommodate a four-wheel-drive vehicle to access the site for installation and monitoring of the installed equipment. Access roads would be sited to minimize disturbance and, to the extent possible, would utilize existing tracks and roads. If outside the previously approved corridors or disturbance areas, additional biological and cultural clearances would be required to secure additional approval from BLM and/or Reclamation. The temporary towers for power curve testing would be designed and constructed in a manner consistent with industry standards, and approved under an amendment to the ROW applications filed with BLM and Reclamation.

The met tower structures are gray, and made of light-weight, galvanized steel tubing that slides together without bolts or clamps. The tubes are made from a combination of 10-, 5-, and 0.5-foot sections. Each tower would be transported in three pieces and assembled on site.

The met towers rest on a 3-foot by 3-foot steel base plate. The total occupied area would be approximately 9 square feet for each tower. Land requirements include a 20-foot permanent radius for monitoring and repair and a 150-foot radius temporary work area. Towers would be installed over a 5-day period by a crew of four to six people using a four-wheel-drive vehicle. Access to each met tower would be via an approximately 10-foot-wide cross-country access route from the nearest existing road. Existing four-wheel-drive tracks or roads would be used when available. Access for maintenance and repairs would be provided by four-wheel-drive truck or foot. Temporary met towers, except for those required for the purpose of power performance testing, would typically be removed just prior to starting construction on the turbine foundations. Temporary met towers required for power performance testing would be removed within 12 months following commercial operation of the Project. Ground disturbance from temporary met towers located in areas that are not disturbed by turbine construction or other Project elements would be reclaimed after the towers were removed.

Three to four permanent met towers would be constructed within the Project Area to remain throughout the life of the Project. While specific locations for the permanent met towers would be sited during final design, it is anticipated that they would be placed within turbine corridors, likely near the perimeter of the Project. These un-guyed (i.e., no stability wire) lattice structures would be approximately 279 feet tall (or at least as tall as the hub height of the turbines selected to be installed), designed in a manner consistent with industry standards, and appear similar to a radio tower (see Figure 2-15). Wind data would be collected up to the turbine hub height on these permanent meteorological towers. The sloped lattice of the structures would deter birds from perching on these towers. The permanent met towers would require a red strobe light for nighttime marking, which is required by FAA because they would be more than 200 feet tall. The permanent met towers would be used to monitor wind resources and to document the capacity of wind power that could be generated.

Figure 2-15 Temporary and Permanent Meteorological Towers

2.5.2.12 Other Construction Considerations

Construction Waste

Clearing and disposing of trash, debris, and shrub/scrub on those portions of the site where construction would occur would be performed at the end of each work day through all stages of construction unless held for later use in reclamation. Existing vegetation is sparse in most locations, and clearing would be performed only where necessary. Excavations made by clearing activities would be backfilled as soon as practical (e.g., after cable infrastructure is tested or when turbine foundations have cured) with compacted earth/aggregate available on site. Disposal of non-hazardous cuttings and debris would be in an approved facility designed to handle such waste or at the direction of the BLM/Reclamation-authorized officer, which may include using vegetative cuttings as mulch in the Project Area during reclamation. Site cleanup would be performed on a continuous basis.

Traffic

The number of construction personnel on site is expected to range from 300 to 500 (during peak construction). Construction traffic is expected to usually be around 215 trips[7] per day into and out of the site, and peak at approximately 311 trips per day during the construction period (based on 200 construction personnel vehicles leaving and entering the Project site and 50 delivery trucks entering and leaving). This is likely to be the maximum amount of trips and would only occur for no more than three to six months. Personal vehicles of construction personnel would be parked at the main staging area for the site. BP Wind Energy would request that the construction personnel utilize a ride sharing program to reduce the number of vehicles entering and exiting the site on a daily basis. This encouragement would be made at orientation for new workers and also from time to time at the morning meetings. From this point, interior roads for construction access would be used only by delivery trucks and on-site construction vehicles; employee personal vehicles would not be driven throughout the Project site. Vehicles would be required to operate within the speed limit of 25 mph.

Construction traffic would be predominantly during weekdays, but some weekend and evening work may be required during peak construction periods. Most work done at night would be to take advantage of lower wind conditions or cooler temperatures.

Site Security

The HSSE Plan would be developed prior to the construction stage of the Project to address health and safety risks and requirements. As the Project moves into the operational stage, the components of the HSSE Plan would be modified to adapt to O&M activities.

BP Wind Energy would post safety and warning signs informing the public of construction activities where the road(s) enters the Project Area from a public road. During construction, access to the site would be monitored and controlled, so as to prevent public access during such times when it would not be safe for public on-road or off-road use within the Project Area. During non-construction hours a security guard would patrol the Project Area to prevent or minimize the threat of unauthorized dumping via use of the new roads, vandalism, theft of property, and incidents that could affect public health and safety. Within the Project Area recreational off-road vehicle use would be restricted during construction. Recreational off-road vehicle use outside of construction areas is likely to remain unchanged from the present situation, except for restrictions at the substation, switchyard, and O&M building, and during maintenance activities if safety considerations require temporary restriction(s).

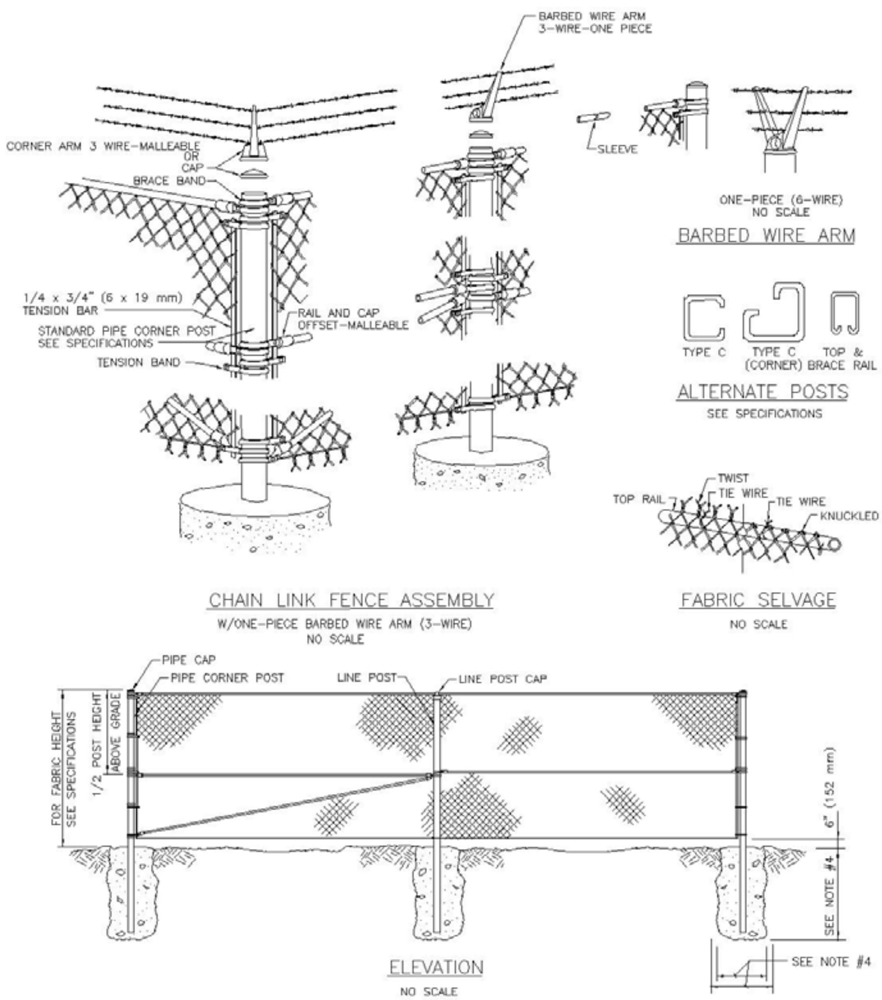
Gates to chain link fenced areas, including the substations, switchyard, select lay down yards, and O&M area, would remain open during construction hours in working areas and would be locked at night or during non-construction hours. Gates or cattle guards would be installed where openings are needed within fences, and the road may also be physically gated during non-construction hours. During non-construction hours, gates would be closed and a security guard would patrol the site area. Temporary warning fences or barricades (consisting of warning tape, barricades, plastic mesh, and/or warning signs) would be erected in areas where public safety risks could exist and where site personnel would not be available to control public access (such as excavated foundation holes and electrical collection system trenches). Fences would be installed around laydown areas, areas deemed hazardous, or areas where security or theft are of concern, and would be removed at the completion of the construction period. BP Wind Energy would coordinate the fencing activities and locations with the BLM and/or Reclamation,

[7] One trip is defined as a round trip (that is a vehicle exiting the last public roadway, US 93, entering into the project site, and then returning back to the public roadway).

as appropriate. A permanent chain-link fence would be installed around the Project O&M building, substations, and switchyard for safety. Temporary fencing around unfinished turbine bases would be designed to warn people of the potential danger. Excavations would be fenced with high visibility plastic mesh.

As illustrated in Figure 2-16, permanent fences would generally be chain-link fence, treated to minimize reflections off the metal, 8 feet in height, and topped with barbed wire where appropriate for safety and security. An auger would be used to dig 9- to 12-inch-diameter holes to a depth of about 38 inches for fence posts with the dirt excavated from the hole used to backfill the hole and secure the fence post (see post installation notes on Figure 2-16).

Figure 2-16 Fencing Diagram



NOTES:

1. POST SPACING: LINE POSTS SHALL BE EVENLY SPACED, CENTER TO CENTER.
2. BARBED WIRE ARM: SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
3. TERMINAL LINE POSTS, & TOP/BRACE RAIL SHALL BE ACCORDING TO THE SPECIFICATIONS.
4. POST SETTING SHALL BE ACCORDING TO THE FOLLOWING TABLE:
5. THE METRIC CONVERSIONS ARE PROVIDED IN PARENTHESIS FOLLOWING THE ENGLISH UNITS.

POST SETTING REQUIREMENT			
TYPE OF POST	HOLE DIA. AT TOP*	HOLE DEPTH	POST EMBEDMENT
LINE	9" (229 mm)	38" (965 mm)	36" (914 mm)
TERMINAL	12" (305 mm)	38" (965 mm)	36" (914 mm)

*MIN. HOLE DIAMETER IN SOFT OR LOOSE SOIL SHALL BE 18" (457 mm).

2.5.3 Post-Construction

A draft Integrated Reclamation Plan has been developed and includes general restoration procedures, native plant salvage, and noxious and invasive weed control. An Eagle Conservation Plan/Bird Conservation Strategy (ECP/BCS) and Bat Conservation Strategy also have been developed, which includes two years of post-construction monitoring for bird and bat fatality. Temporarily disturbed areas would be returned to original conditions, to the extent feasible. Trash and construction debris would be removed and properly disposed of off-site in appropriate landfills. Vegetative cuttings may be properly disposed of off-site or used as mulch in the Project Area during reclamation. An appropriate weed-free seed mixture suitable for the arid desert environment would be identified in the Integrated Reclamation Plan. Healthy native plants salvaged during the clearing activities would be transplanted to disturbed areas in accordance with the Integrated Reclamation Plan. To the extent feasible, this would include transplanting salvaged plants directly into earlier phases of construction that are ready for reclamation efforts. Fill material used around foundations or roads would be compacted to 80 percent or greater as required for soil stability. No soil stability problems are anticipated from the Project construction.

Temporary facilities (such as the batch plant and laydown/staging areas) would be removed as soon as practical following construction and the sites where these features were located would be reclaimed. Post-construction activities to assist with the reclamation and revegetation of the construction work areas would be completed within one year of completing construction of the Project and would include:

- Re-grade site to pre-construction contours where feasible. After foundations are poured and concrete cures to engineered strength (approximately 30 days), soils moved from foundation areas would be replaced. Excess fill (excluding removed topsoil) would be packed around foundation bases or elsewhere in the Project, such as fill material for interior roads to increase elevations and widen corners.
- Strip and segregate vegetation and topsoil where grading would occur to conserve the existing seedbank. Natural vegetation will be cleared or trimmed only when necessary to provide suitable access for construction, and O&M of the proposed wind farm facility. Where vegetation needs to be trimmed and/or removed for construction, but not for actual operations, it may be clipped or sheared at ground level to help facilitate resprouting.
- Supplement mulch materials with vegetation removed during project construction. Mulching would be implemented during all phases of development in reclaimed areas with certified weed-free mulch to protect the soil surface from wind and water erosion.
- Store vegetation removed during project construction at the edge of the construction work areas, and respread during or after final grading to provide help trap seeds, shade seedlings, and conserve water for the revegetation of the construction work area.
- Redistribute topsoil evenly across the surface of the construction work area after construction is complete.
- Loosen soil surfaces that have become encrusted or compacted during construction, as determined necessary and practical to encourage plant growth and prepare the seed bed by providing soil amendments, if needed.
- Imprint disturbed soils with equipment that would create indentations to catch seeds and water, aiding in the natural revegetation of the construction work area.

During reclamation of temporary road beds, aggregate materials would be removed and transported offsite or stockpiled onsite for the separation of salvageable material. Once the aggregate base is removed, the ground would be decompacted and restored to pre-existing conditions and contours. The remaining 16-foot-wide on-site service roads would be regraded smooth with low spots and ruts filled in with the reusable gravel base material.

Restoration procedures would be followed per the Integrated Reclamation Plan proposed by BP Wind Energy and approved by BLM and Reclamation. A restoration punch-list would be developed to encompass the various Project restoration requirements from the NEPA process and Project permitting requirements. Construction activities would not be deemed complete until the regulatory agencies with jurisdiction over the Project have acknowledged that the restoration activities have been adequately implemented and desired results have been achieved.

2.5.4 Operation and Maintenance

2.5.4.1 Final Testing

The functionality of the wind turbines and safety systems would be tested to ensure they operate in accordance with the manufacturer's specification before the turbines are commissioned for operation. After the 345-kV or 500-kV overhead transmission line is installed and interconnected with the turbines' 34.5-kV system, these components of the Project would be energized by closing the breaker to allow voltage/electricity onto the line or portion of facility. Energization would start at the point of interconnection and eventually be energized all the way to the turbines. In general the order of energizing the system would be, the switchyard (point of interconnection), then the transmission line, then the substations, then the collection system, then the pad mounted transformers at each turbine, and then finally the turbines. At each stage testing would be performed to ensure the equipment has been installed correctly. When all systems have been tested and are operating properly, the Project would be commissioned for commercial operation and sale of energy.

2.5.4.2 Site Operation and Maintenance Procedures

Because wind farm facilities are comprised of many individual wind turbine generators, O&M activities would not affect the entire wind farm's operation. Annual maintenance would be conducted on a turbine-by-turbine basis and would not affect performance of the wind farm.

BP Wind Energy also would schedule annual maintenance for the wind farm during the season with the lowest expected wind resource (typically summer) in order to minimize impacts on the performance of the facility.

The operational staff would maintain the turbines, including routine maintenance, long-term maintenance, and emergency work. In all cases, the facility staff would be responsible for arranging needed repairs either through internal resources or with the aid of additional contractor support.

Routine wind turbine maintenance and service would occur every six months commencing after the first six months that the Project is in service. This includes the following activities:

- Hydraulic pressure checks
- Accumulators' nitrogen recharge
- Oil level checks on all operating parts
- Visual checks for leaks

- Grease all bearings on moving parts
- Check all bolt torques
- General clean-up within the wind turbine
- Perform any additional modifications/replacements needed

The oil in the gearbox is normally changed every 18 months or after lab analysis of the lube oil indicates that the oil must be changed. Routine maintenance is generally completed by climbing the tower using the internal ladder and doing the work with normal hand tools and electrical testing equipment.

Long-term maintenance may include replacement/rebuilding and cleaning larger components such as generators and gearboxes, testing electrical components, and refurbishing blades. Emergency work also may be required as the result of a system or component failure. Certain unplanned work such as blade repairs or repairs to other large components may require the use of a crane to complete the work. If necessary, a crane would be brought in on trucks and assembled at the turbine site such that the permanent 16-foot wide road (20-foot wide with shoulders/ditches) would be sufficient for site access, and the 10-foot wide shoulders would not need to be reinstalled.

BP Wind Energy and its contractors would demonstrate due diligence and timeliness in the repair, replacement, or removal of inoperative turbines.

During the Project operations period, roads would be specifically inspected for erosion, blockage of culverts, and damaged cattle guards twice annually; identified problems would be addressed to correct the concern. In addition, road conditions would be inspected after heavy rain fall. Roads would be inspected monthly and periodic grading or replacement of gravel may be required to maintain road quality. Road maintenance would be scheduled when wind speeds are less than 22 mph to minimize airborne dust. To limit airborne dust and the erosion of roads, speed limits of 25 mph would be posted and required of all O&M personnel. Because roads used in operations and maintenance would be graveled, traffic would be very limited, and speed limits would be low, the need for dust suppression is not anticipated. During Project operations, public access to the Project site would be monitored at certain access points to provide for the safety of the public in and around the operating equipment.

Long-term dispersed recreational use throughout the Project Area would continue to be allowed. Off-road vehicle use and recreational access to the Project Area is likely to remain unchanged from the present situation, except for restrictions at the substation, switchyard, and O&M building, which would be areas located outside roadways. Public access in the Project Area may be temporarily restricted during maintenance activities on roads or facilities, when warranted for public safety reasons. Access also may be temporarily restricted (i.e., closed to public vehicle travel), upon approval by BLM and/or Reclamation, in areas where reclamation efforts have been undertaken and public access into those areas would diminish the reclamation efforts.

The transmission line ROW would be cleared, as needed, to ensure that vegetation does not come within the safe operating distance of the transmission line. Given the vegetation in the area, this clearing work would likely be selective and occur very rarely during the life of the Project. Substation and switchyard maintenance may include an underlayment, physical or biological methods, or treating crushed rock surfaces with herbicides to control weeds, if approved by the BLM and/or Reclamation. In general, unless there are unplanned events such as repair of turbine components due to manufacturer defects, maintenance would only consist of routine inspections and services that would require only normal access to the Project site.

2.5.5 Decommissioning

The Project is anticipated to have a lifetime of up to 30 years after which it may no longer be cost effective to continue operations. The Project would be decommissioned, and the existing equipment removed. At that time, a Decommissioning Plan would be provided to BLM and Reclamation for review and approval, and would address the procedures described in this section.

The goal of Project decommissioning is to remove the installed power generation equipment and return the site to a condition as close to a pre-construction state as feasible. The major activities required for the decommissioning are as follows:

- Remove wind turbines and met towers
- Remove aboveground substations, transmission line, any aboveground collection lines.
- Structural foundations would be removed in accordance with a BLM- and/or Reclamation-approved decommissioning plan
- Remove roads not desired for other purposes
- Re-grade and recontour the disturbed area
- Revegetate

The most noticeable decommissioning activity to the public would be the removal of the wind turbines and met towers. The disassembly and removal of this equipment, including the large components that make up a wind turbine, would essentially be the reverse order of the installation activities and utilize similar equipment. The rotor (hub and blades) as well as the met towers would be removed from the top down by the main crane with the help of a smaller crane. Once the turbine rotors have been removed and disassembled into loose parts, the components would be placed directly onto a truck bed and taken off the site. This approach would limit the need for clearing an area around the turbine base to just enough area to set down the rotor.

BLM and Reclamation would be consulted at the time of decommissioning to determine if it is desired to remove the cables buried between each turbine, or leave them in place. Removal of the cables would likely cause some environmental impact that would need to be mitigated, but leaving them in place could impact future uses of the site. If it is decided that the cables should be removed, an appropriate technique in use at the time of decommissioning would be used. This potentially may include opening the trench to pull the cables out or using a mechanical device to cut the cables and pull the cables from beneath the soils. Trenches to access the cable would then be filled with native soil, compacted, and revegetated.

Once the Project and transmission line are de-energized, the substations, steel structures, and control building would be disassembled and removed from the site along with all foundations and other concrete features. Unless Western identifies an alternate use for the switchyard, it would be de-energized and decommissioned as well. The fence and fence posts would be removed. The gravel placed at Project facilities would be removed and replaced with native rock, if surface rock is prevalent in the immediate area. BLM and Reclamation would be consulted to determine if the buried substation grounding grid should be removed or left in place. Assuming the Project transmission line no longer serves a purpose for the site, it would be disassembled and removed with the foundations. The tower structures would then be disassembled and removed. The areas around the poles, including interior roads for access, would be reclaimed to the satisfaction of BLM and/or Reclamation.

The O&M building would be dismantled and removed.

Foundations of the wind turbines, met towers, substation components, and transmission line structures would be removed in accordance with a BLM- and/or Reclamation-approved decommissioning plan. Fully removing the wind turbine foundations would require major excavation/disturbance at each tower site, as well as additional truck haul-away traffic. This could contribute to environmental impacts to native plants and wildlife, as well as a potential temporary reduction in air quality resulting from additional dust and truck emissions. Because the foundations are composed of non-leaching/natural elements that should not present a hazard to the environment and because of the extent of excavation required to remove deep foundations, removal of the sections of the foundations below 36 inches from the ground surface would cause greater environmental impacts than leaving them in place. Therefore, it is proposed that these portions of the foundations would not be removed. Shallow foundations, like that for the O&M building and substation/switchyard components, would be removed in their entirety. All concrete and steel debris would be removed from the site. Voids left by the removed concrete foundations would be filled with native material and to the extent possible restored to original grade.

To facilitate the various uses for the property, BLM and Reclamation may choose to leave the roads in place. If the roads are retained, maintenance of the roads would become the responsibility of BLM and/or Reclamation. Improvements to the access road that extend into the US 93 ROW would be coordinated with ADOT to determine if the improvements should be retained or reclaimed. When the necessary equipment and materials have been removed from an area and the road to that area is no longer needed, it would be reclaimed. For areas where equipment or materials are removed, those areas would be re-graded back to pre-construction contours (if possible).

2.6 ALTERNATIVES

Alternatives to the Project are developed to provide decision makers with a clear basis for choice by showing consideration of different and reasonable paths for accomplishing BLM's purpose and need (BLM 2008b). Five alternatives are considered in this EIS. Alternative A is the proposed action identified by BP Wind Energy. To respond to scoping comments and to reduce disturbance-related impacts, BLM has identified three additional action alternatives for analysis. As discussed in Section 2.5, all action alternatives use a corridor approach for analysis of turbine numbers and spacing with consideration of the wind resource, impacts to economics and natural and cultural resources, safety and construction requirements. Alternative B reduces the Wind Farm Site footprint and has fewer turbines than Alternative A to reduce visual and noise impacts primarily on Lake Mead NRA and secondly on private property. Alternative C also reduces the Wind Farm Site footprint and has fewer turbines than Alternative A to reduce visual and noise impacts primarily on private property and secondly on Lake Mead NRA. Alternative E is the Agencies' Preferred Alternative, which is a combination of elements of Alternatives A and B (i.e., reduces visual and noise impacts on Lake Mead NRA and private property) that addresses potential impacts on golden eagles while providing a large enough development area to meet nameplate generation capacity requirements. Alternative D is the no-action alternative in which the Project would not be built.

Within the Project, there are options available related to certain Project components that are considered in the analysis. Any of the options identified in the description of the Project components and discussed in Section 2.6.1 could be selected to identify variations of the proposed action alternatives and still satisfy the purpose and need.

2.6.1 Project Feature Options

Table 2-5 summarizes the Project feature options. A description of each of the options follows Table 2-5. Alternative A, which is described in Section 2.6.2, includes white turbines, but either option for the transmission line interconnection and collector lines. Alternatives B and C, described in Sections 2.6.3 and 2.6.4, include consideration of all of these options.

Table 2-5 Project Feature Options

Project Feature	Option 1	Option 2
Turbine Color	White	Light gray (such as RAL 7035 or equivalent)
Transmission Line Interconnection	345-kV Liberty-Mead on site	500-kV Mead-Phoenix on site
Collector Lines	All below ground	Partly below ground, partly aboveground

Turbine Color

Two turbine color options have been identified for consideration. Turbines may be a shade of white with a non-reflective matte or satin finish, such as RAL 9010 on the RAL standardized color chart or an equivalent color tone. The other proposed option would be to install turbines with a light gray color that is no darker than RAL 7035 or equivalent. Regardless of the color, FAA would require night time marking with red strobes on selected turbines for obstruction marking. Light gray turbines are being analyzed to assess if a turbine color other than white would blend in better and reduce visual impacts.

Transmission Line Interconnection Location

System studies indicate that two high-voltage transmission lines passing through the Project Area have the capacity to carry the power that would be generated by the proposed wind farm. These include the 345-kV Liberty-Mead line and the 500-kV Mead-Phoenix line and are shown on the maps of the alternatives described in Sections 2.6.2 through 2.6.4. Each of these transmission lines offers an option for tying the Project into the electrical grid and each optional line would influence the location of the switchyard for the interconnection. Up to 6 miles of transmission line within the Wind Farm Site would be needed from the substation, where wind turbine output voltage would be stepped up to the transmission-level voltage, to the switchyard where the Project would be interconnected to the existing transmission lines.

Collector Lines

Two collector line options have been identified. One option is to bury all of the collector lines underground in trenches parallel to interior roads. The second option is to bury most of the collector lines, particularly those that link the turbines within a row to one another, and to place no more than about 15 miles of collector lines aboveground on poles that are about 35 feet tall. Aboveground structures would be used to span sensitive environmental and cultural features and steep terrain, and may also be used where multiple collection circuits would otherwise run in parallel. Temporary disturbance for aboveground support structures would be within the area disturbed for temporary roads; collectively, permanent disturbance associated with aboveground structures is estimated at about 0.25 acre for the entire Project. On-site engineering and other construction constraints would ultimately determine whether aboveground or underground collector lines are built in many instances.

2.6.2 Alternative A – Proposed Action

Maps 2-2, 2-3, and 2-4 illustrate the location of key features for Alternative A, each map corresponding to a particular physical turbine size based on rotor diameter. The Wind Farm Site would encompass approximately 38,099 acres of public land managed by the BLM and approximately 8,960 acres of land managed by Reclamation. As with all action alternatives, Project features within the Wind Farm Site would include turbines aligned within corridors, roads, an operations and maintenance building, two temporary laydown/staging areas (with temporary batch plant operations), two substations, and a switchyard. The number of turbines constructed would vary depending on the turbine type that is installed as well as the sensitive natural and cultural resource, engineering, construction and safety constraints specific to each turbine corridor, but Alternative A proposes potentially more turbines than the other alternatives. As shown in Table 2-6, Alternative A could support development of 203 to 283 turbines, depending on turbine size chosen and the specific constraints of each corridor. The turbine layouts shown in Maps 2-2, 2-3 and 2-4 show a representative layout of the turbines, based on rotor diameter, within the corridors that might be considered with Alternative A. The specific turbine count and layout would be determined through micro-siting, which may include analysis of the physical constraints of the landscape, the strength of the wind resource, geotechnical testing results, and avoidance of waters of the U.S. and cultural resources, among other factors; micro-siting would occur as part of the Plan of Development. Flexibility to place turbines within the corridors would be necessary across all of the alternatives in order to address specific engineering and environmental constraints identified through this EIS and during BLM's and Reclamation's review of construction plans prior to issuance of notices to proceed / right to use authorization with construction. Thus, the actual number and layout of turbines constructed under each action alternative would likely vary from the representative layout shown in this document. However, the turbines would not be greater than the maximum number of turbines analyzed in the EIS and would stay within the corridors analyzed. The turbine corridors shown for Alternative A are designed to provide sufficient flexibility in order to achieve the nameplate capacity of 425 MW or 500 MW respectively, while allowing BP Wind Energy the needed flexibility to choose between all turbine sizes being analyzed as discussed in Section 2.5. All action alternatives would include an approximately 3-mile primary access road between the Wind Farm Site and US 93 and the temporary use of the existing Detrital Wash Materials Pit as source material for the base material of roads and for concrete needed for foundations. All action alternatives also would include three to four permanent met towers within the Project Area that would remain for the life of the Project. The existing water wells in the immediate vicinity of this Materials Source and the proposed new well at the O&M building would provide water needed during construction for batch plant operations and dust suppression with all action alternatives. The temporary pipeline for transporting water to the southern laydown area and the distribution line supplying power for batch plant operations (and possibly the operations and maintenance building) would be within the primary access road ROW between US 93 and the Wind Farm Site. Site preparation, Project components, construction activities, post-construction activities, operations and maintenance, and decommissioning of the Project are described in Section 2.5.

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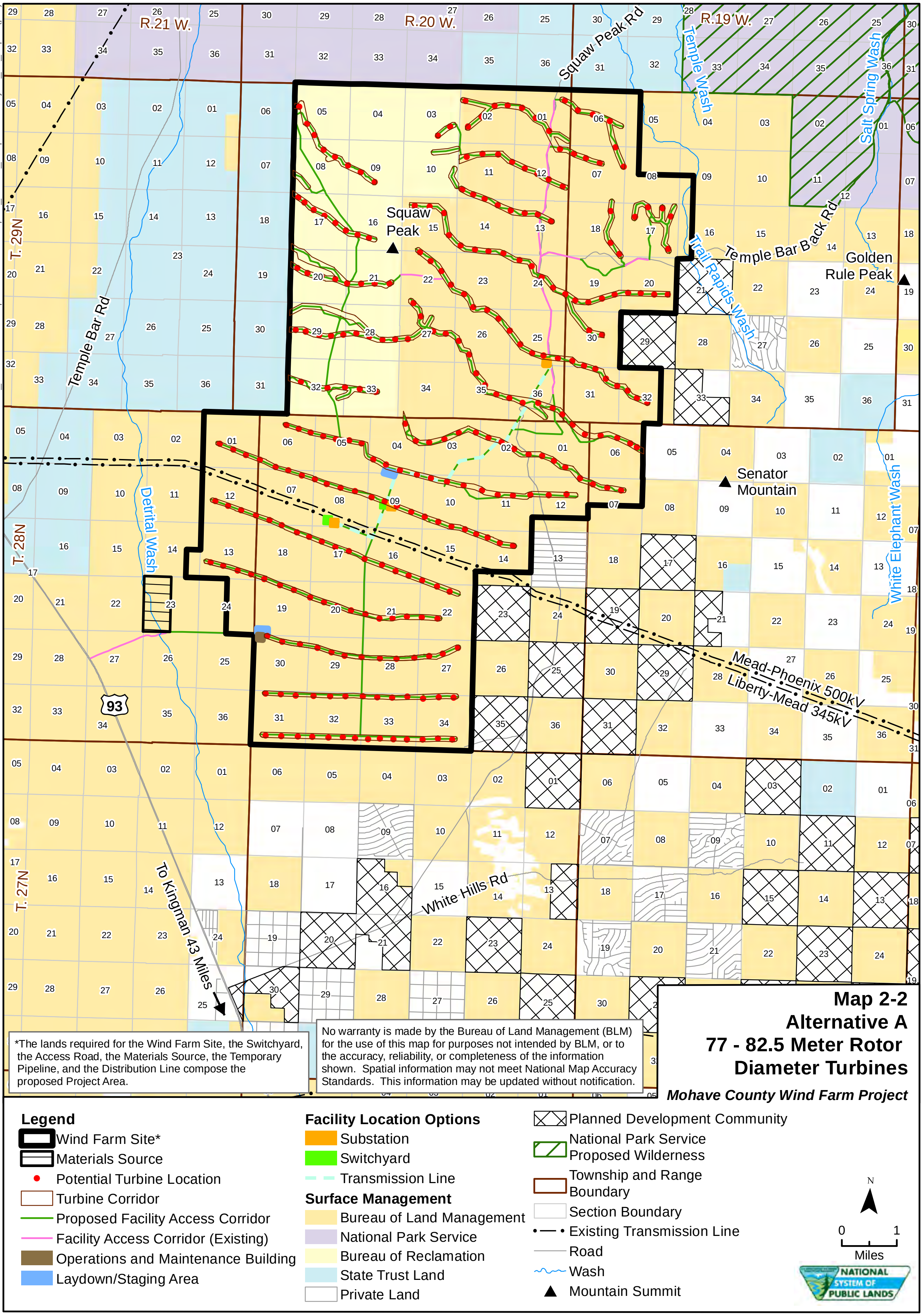

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

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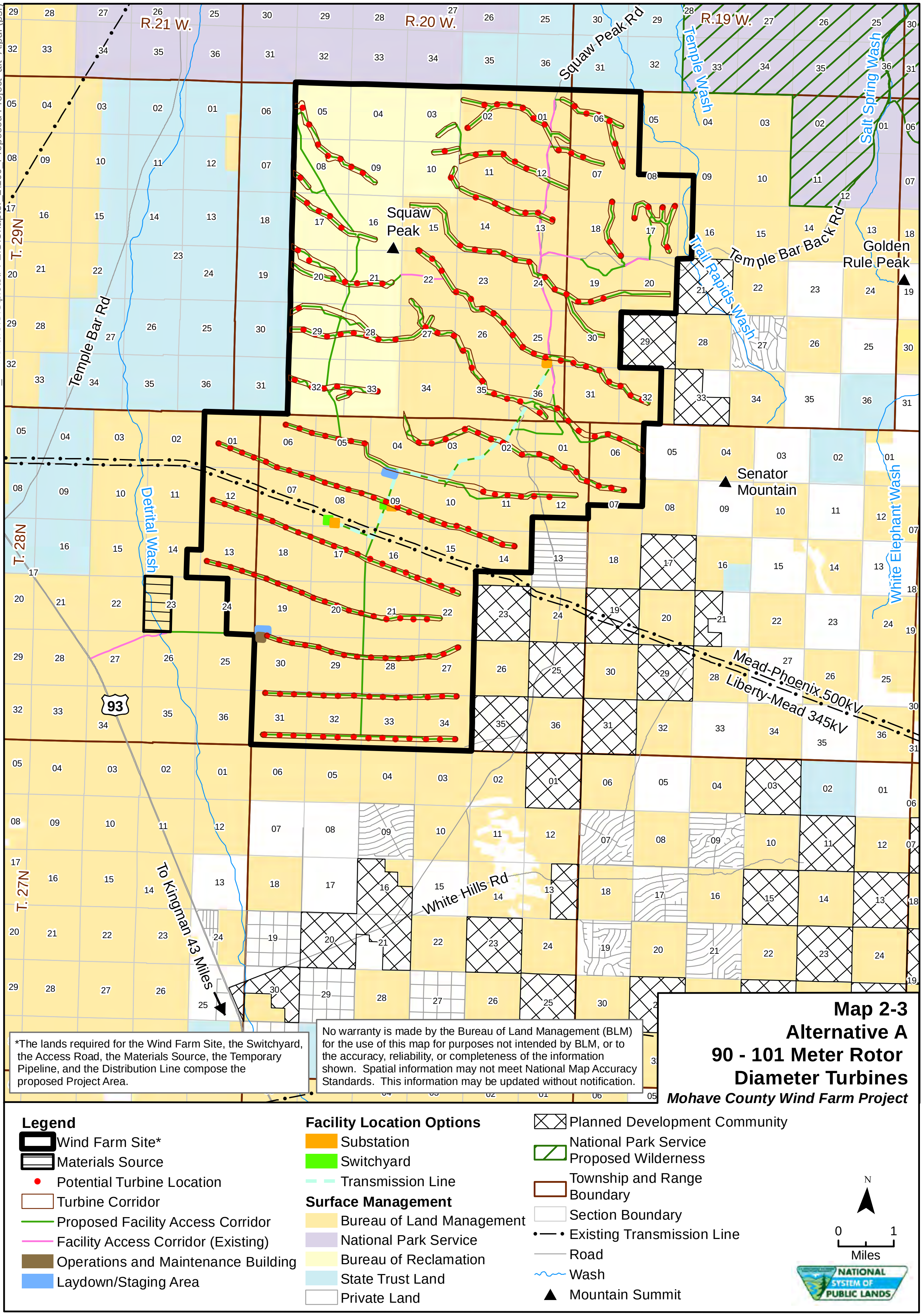

Map 2-3
Alternative A
90 - 101 Meter Rotor Diameter Turbines
Mohave County Wind Farm Project

*The lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

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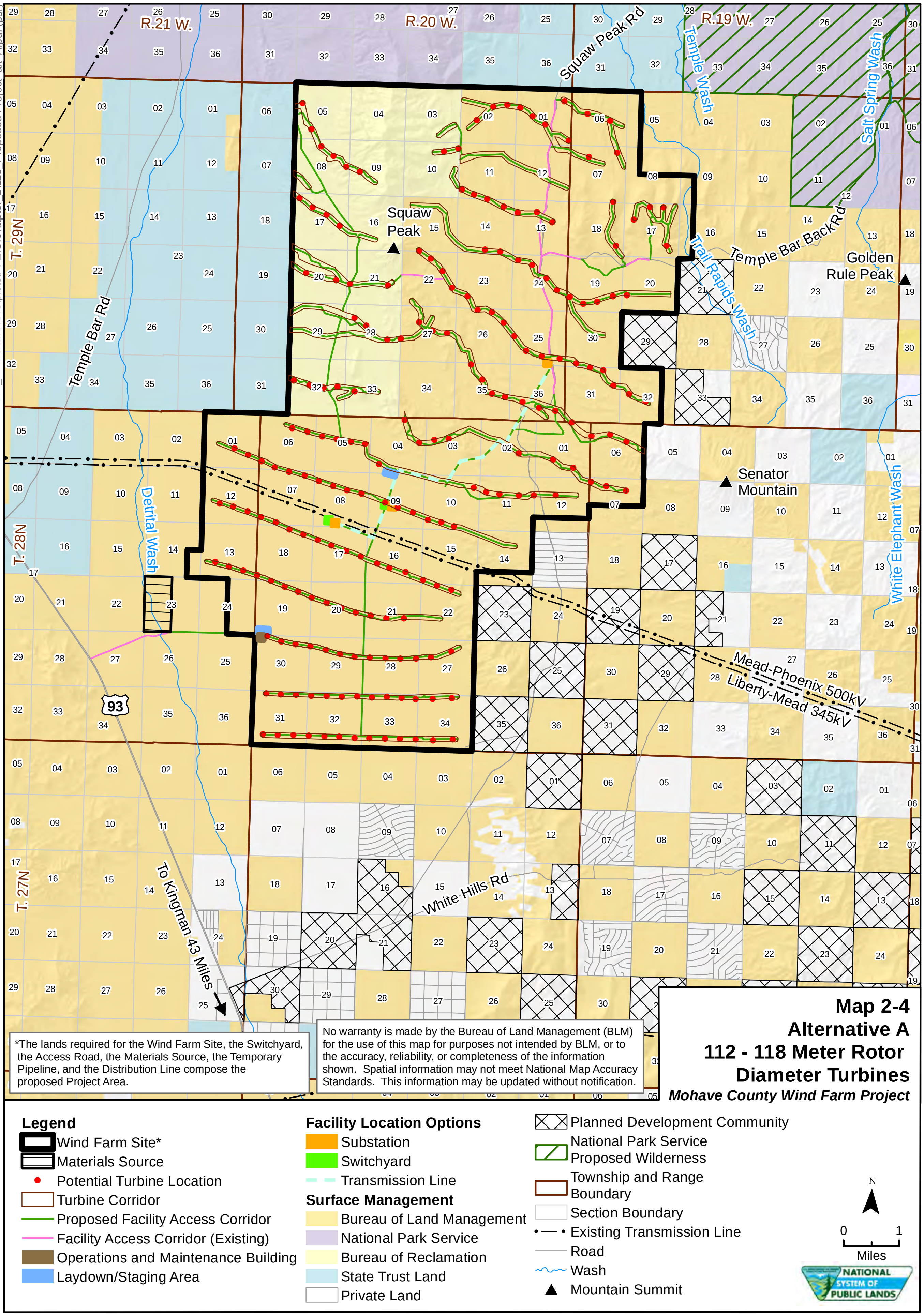

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Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

Table 2-6 Range of Turbine Types, Turbine Counts, and Range of Power Production by Alternative

Alternatives (acreage)	Turbine Rotor Diameter (meters)	Per Turbine Electrical Output (MW)	Number of Turbine Positions [1]	Power Production (MW) [2]
Alternative A				
38,099 on BLM; 8,960 on Reclamation	77 to 82.5	1.5	283	425
	90 to 101	1.6 to 2.0	255	408 to 500
	112 to 118	2.3 to 3.0	203	467 to 500
Alternative B				
30,872 on BLM; 3,848 on Reclamation	77 to 82.5	1.5	208	312 [4]
	90 to 101	1.6 to 3.0	194	310 [4] to 500
	112 to 118	2.3 to 3.0	153	352 [4] to 459 [3]
Alternative C				
30,178 on BLM; 5,124 on Reclamation	77 to 82.5	1.5	208	312 [4]
	90 to 101	1.6 to 3.0	194	310 [4] to 500
	112 to 118	2.3 to 3.0	154	354 [4] to 462 [3]
Alternative E				
35,329 on BLM; 2,781 on Reclamation	77 to 82.5	1.5	243	364 [4]
	90 to 101	1.6 to 3.0	228	364 [4] to 500
	112 to 118	2.3 to 3.0	179	411 to 500

NOTES:

[1] Number of turbines positions is approximate and subject to minor changes as the Project moves through detailed design and into construction.

[2] Greater than 500 MWs total Project generating capacity is physically possible for some turbine models, but the Project would not exceed 500 MW as that is the maximum output sought per the Project's transmission interconnection applications.

[3] If the Project interconnects to the 500-kV Mead-Phoenix transmission line, a 500 MW nameplate capacity would be achieved by using a combination of turbine types with certain corridors using a turbine model with high MW capacity but a smaller rotor diameter that can be spaced more closely together. Therefore, the maximum number of turbines would be within the range of 153-194 turbines.

[4] The power production range falls below the applicant's need to meet an interconnection requirement of 425 MW to 500 MW if turbines of lower nameplate MW were selected.

While the various Project feature options of transmission line interconnection and collector lines could be considered with Alternative A, BP Wind Energy would prefer to install industry-standard non-reflective white or light off-white turbines. Future studies would determine the best solution for the collector lines, but BP Wind Energy anticipates a combination of underground and aboveground collector lines would be most suitable to handle topographic and geologic constraints. The preferred options for an interconnection cannot be firmly identified until more progress is made in determining which utility is interested in purchasing the power generated by the plant. In addition, the 500-kV Mead-Phoenix line has the potential to be converted to direct current upon approval by the owners (or "participants") involved with that line (of which Western is one). Converting the line to direct current could entail negative operational and financial impacts on the Project proponent and other power generators interconnected to this line. For example, conversion to direct current would isolate the interconnecting power project and force the Project to interconnect with another transmission line in order to move the power generated to the market, which could include a new generation tie line and replacement of the transformer and switchyard equipment if the new interconnection were at a different voltage. In the case of the Mohave Wind Farm Project, sufficient capacity on the 345-kV line would not likely be available at that time, "stranding" the power generated from the Project, and making the Project financially non-viable if it were connected to the 500-kV line and operation was converted to direct current.

With Alternative A, BLM and Reclamation would grant ROWs to BP Wind Energy. BLM would grant a ROW to Western for the switchyard. Western would grant the request for interconnection to the 345-kV line or the Mead-Phoenix participants would grant interconnection with the 500-kV line, with Western designing, constructing, owning, and maintaining the switchyard in either case. Project components, activities, and associated ground disturbance impacts for Alternative A are summarized within Table 2-7. The analysis of this alternative is included in Chapter 4 of this EIS.

Alternative A would meet BLM's purpose and need for the Project by allowing the use of Federal land to help meet projected renewable energy demands, thus providing BLM the opportunity to help increase renewable energy production on public land in compliance with the BLM's Wind Energy Development Policy. This alternative also supports the proposed actions needed by Reclamation and Western for the implementation of the Project by allowing the use of Reclamation-administered Federal land for renewable energy development and offering capacity on Western's transmission system or facilities to support transmission (of renewable energy) on the Mead-Phoenix line.

2.6.3 Alternative B

Through Project scoping and ongoing development of the Project, concerns have been identified by Lake Mead NRA, a unit of the National Park Service (NPS) and a cooperating agency on this Project. Lake Mead NRA staff expressed concern about potential visual and noise impacts from turbines located in proximity to NPS and surrounding lands. In particular, views from Lake Mead NRA and along Temple Bar Road, which passes through State Trust land west of the Wind Farm Site providing access to the recreation area, were a concern as well as turbine-related noise exceeding an hourly equivalent sound level of 35 decibels (dBA L_{eq}) within the Lake Mead NRA boundaries. The NPS lands nearest to the proposed Wind Farm Site are open for back-country camping as well as other recreational activities such as sight-seeing, wildlife watching, and hunting.

During scoping, comments received from the public expressed concern for noise, particularly on residents nearby and recreational users of the area; impacts on views; and, any potential effects on property values.

In response to these concerns, BLM developed Alternative B, as illustrated on Maps 2-5, 2-6, and 2-7, each map corresponding to a particular physical turbine size. While Alternative B may not fully address all concerns for visual and noise impacts, Alternative B offers a Wind Farm Site that is approximately 12,339 acres smaller than Alternative A. The Wind Farm Site would encompass approximately 30,872 acres of public land managed by the BLM and approximately 3,848 acres of land managed by Reclamation. The number of turbines constructed would vary depending on the turbine type that is installed and the full range of micro-siting constraints, including sensitive natural and cultural resources, engineering, construction and safety considerations, but Alternative B could support development of 153-208 turbines, with an energy output from approximately 310 to 500 MW (see Table 2-6). The turbine layouts shown in Maps 2-5, 2-6 and 2-7 show a representative layout of the turbines, based on rotor diameter, within the corridors that might be considered with Alternative B. The specific turbine count and layout would be determined through micro-siting, which may include analysis of the physical constraints of the landscape, the strength of the wind resource, geotechnical testing results, and avoidance of waters of the U.S. and cultural resources, among other factors. Flexibility to place turbines within the corridors would be necessary in order to address specific engineering and environmental constraints identified through this EIS and during BLM's and Reclamation's review of construction plans prior to issuance of notices to proceed / right to use authorization with construction. Compared with Alternative A, turbine corridors on Reclamation land would either be eliminated (from Township 29 North, Range 20 West, Sections 3, 5, 8, 9, 16, 17, 20, and 21) or shortened (Section 10). Certain turbine corridors on BLM also would be eliminated (from Township 29 North, Range 19 West, Sections 17-18, and Township 28 North, Range 20 West, Sections 31-34) or shortened (Township 29 north, Range 20 West, Section 2; Township

29 North, Range 19 West, Sections 19-20, 31-32; and Township 28 North, Range 19 West, Section 6; and Township 28 North, Range 20 West, Section 22 and 27). Shortened or eliminated turbine corridors on the eastern side of the Wind Farm Site would increase the distance between the private lands and the nearest turbine; shortened corridors generally would reduce the turbine count, although it may just change the spacing within the corridor. Other Project features would be comparable to those identified with Alternative A and as described in Section 2.5. All Project feature options (turbine color, transmission line interconnection, and collector lines) would be considered as suitable options for Alternative B.

With a smaller footprint than Alternative A, Alternative B presents greater challenges associated with achieving the nameplate capacity per the interconnection agreements. While it is preferable to have a single turbine type (size and manufacturer) throughout the wind farm for uniformity of equipment, parts, and maintenance processes during operations, one option (to achieve nameplate capacity if a smaller turbine is used) would be to have one or more turbine corridors filled by a larger generation capacity turbine than in the balance of the wind farm. Alternatively, the turbines in certain corridors could be squeezed more closely together as long as they retain the manufacturer's spacing requirements. While tighter spacing may reduce the generation efficiency of an individual turbine, the added turbines may collectively help to achieve the nameplate capacity rating. However, 208 turbines would remain the maximum number of turbines installed with Alternative B. Given the range and complexity of the constraints to be considered prior to issuance of notices to proceed / right to use authorization, achieving even the minimum energy output of 310 MW for Alternative B could require turbine placement within the full extent of all of the corridors shown, if site constraints require avoidance of areas along the corridors. Nonetheless, the Project would still be required to meet the 425 MW or 500 MW interconnection requirements. Thus, Alternative B presents a greater risk than the Proposed Action that, if approved, the Project would not be able to meet the requirements of the interconnection and thus would put at risk the timing and commercially viability of the Project.

With Alternative B, BLM and Reclamation would grant ROWs to BP Wind Energy. BLM would grant a ROW to Western for the switchyard. Western would grant the request for interconnection to the 345-kV line or the Mead-Phoenix participants would grant interconnection with the 500-kV line, with Western designing, constructing, owning, and maintaining the switchyard in either case. Project components, activities, and associated ground disturbance impacts for Alternative B are summarized in Table 2-7.

Alternative B would meet BLM's purpose and need by allowing the use of Federal lands to help meet the projected energy demands. Alternative B supports the proposed actions needed by Reclamation and Western for the implementation of the Project by allowing the use of Reclamation-administered Federal land for renewable energy development and offering capacity on Western's transmission system or facilities to support transmission (of renewable energy) on the Mead-Phoenix line.

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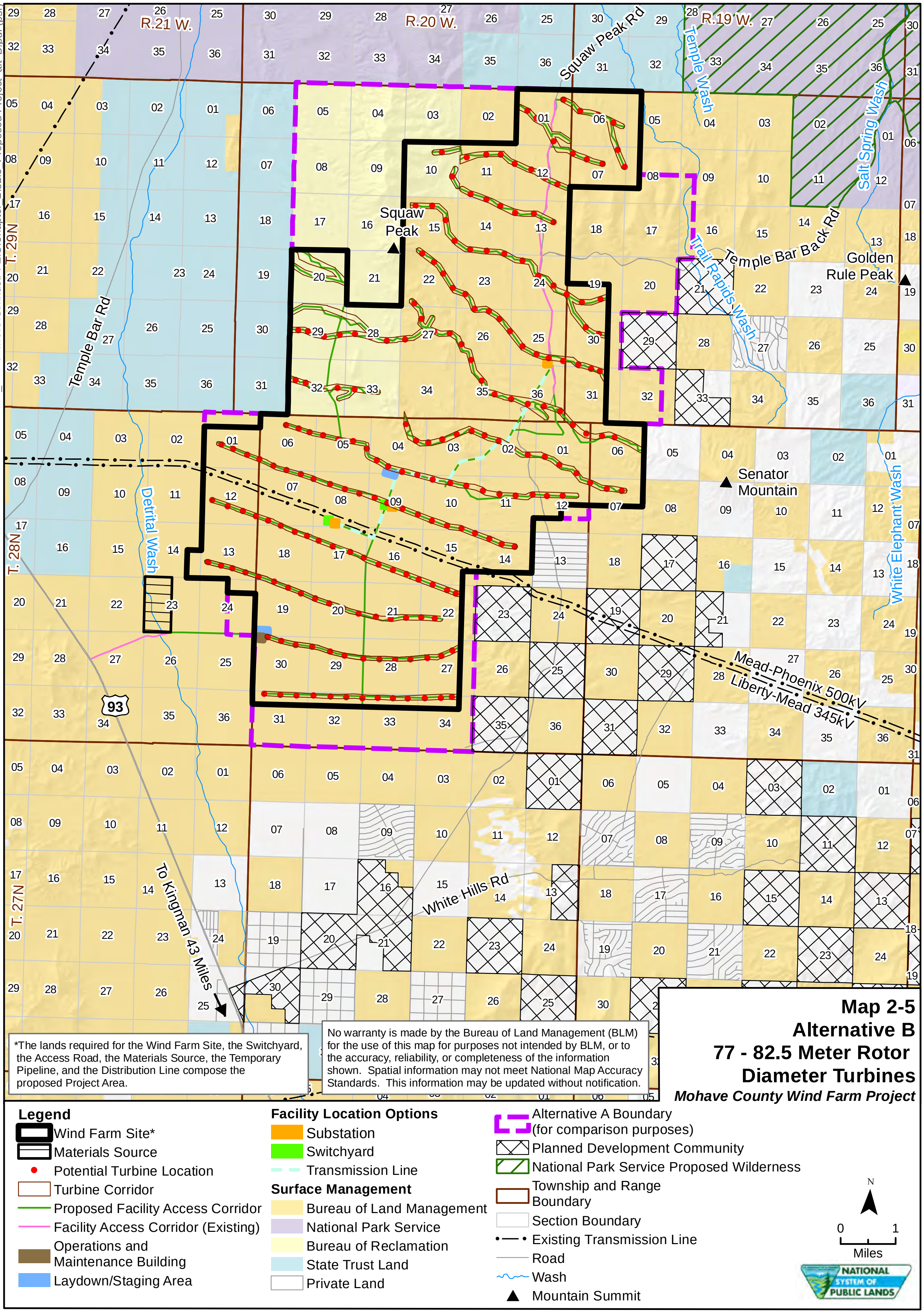
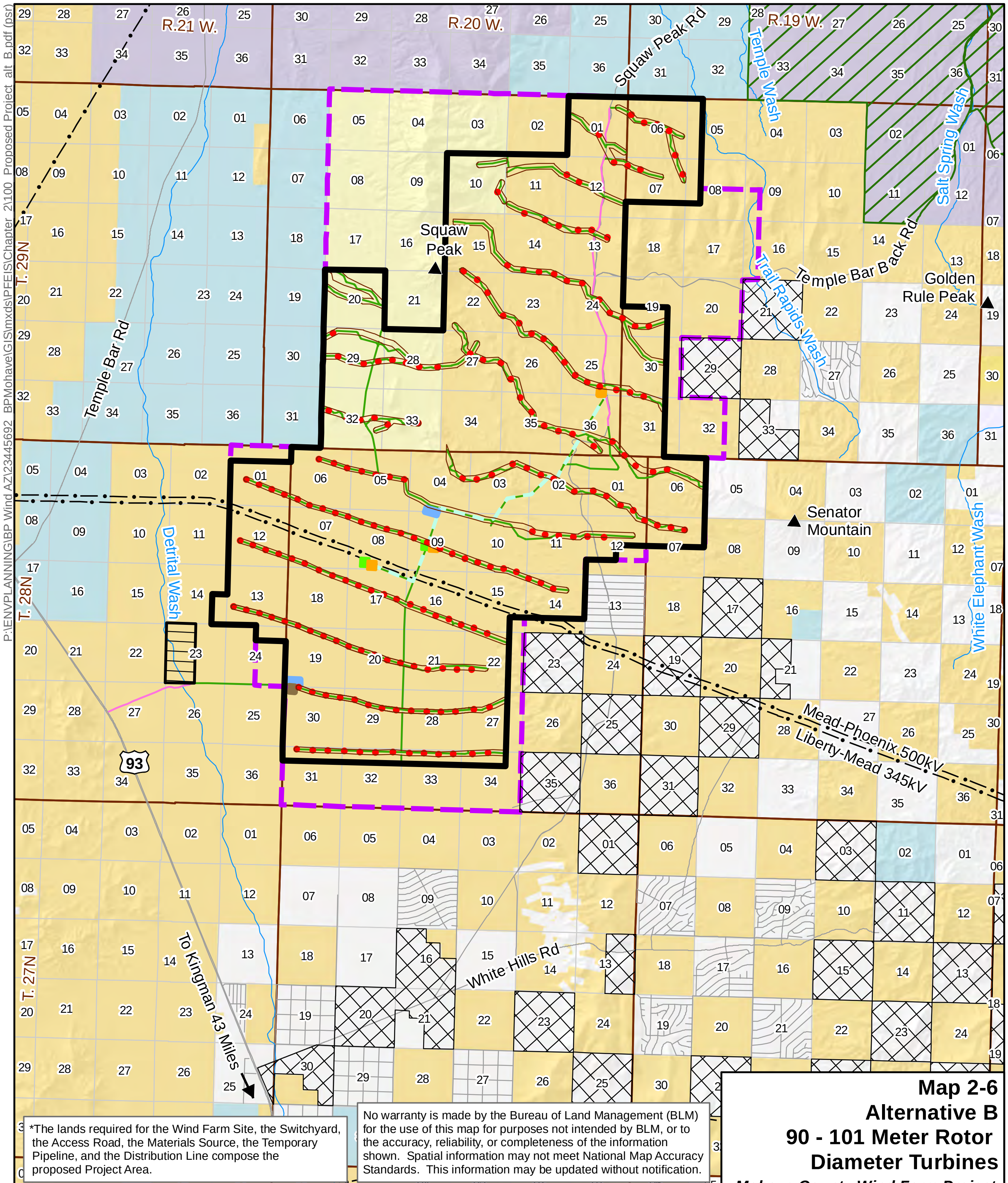


Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)



Map 2-6
Alternative B
90 - 101 Meter Rotor Diameter Turbines
Mohave County Wind Farm Project

*The lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

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Legend

- Wind Farm Site*
- Materials Source
- Potential Turbine Location
- Turbine Corridor
- Proposed Facility Access Corridor
- Facility Access Corridor (Existing)
- Operations and Maintenance Building
- Laydown/Staging Area

Facility Location Options

- Substation
- Switchyard
- Transmission Line

Surface Management

- Bureau of Land Management
- National Park Service
- Bureau of Reclamation
- State Trust Land
- Private Land

- Alternative A Boundary (for comparison purposes)
- Planned Development Community
- National Park Service Proposed Wilderness
- Township and Range Boundary
- Section Boundary
- Existing Transmission Line
- Road
- Wash
- Mountain Summit

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NATIONAL SYSTEM OF PUBLIC LANDS

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

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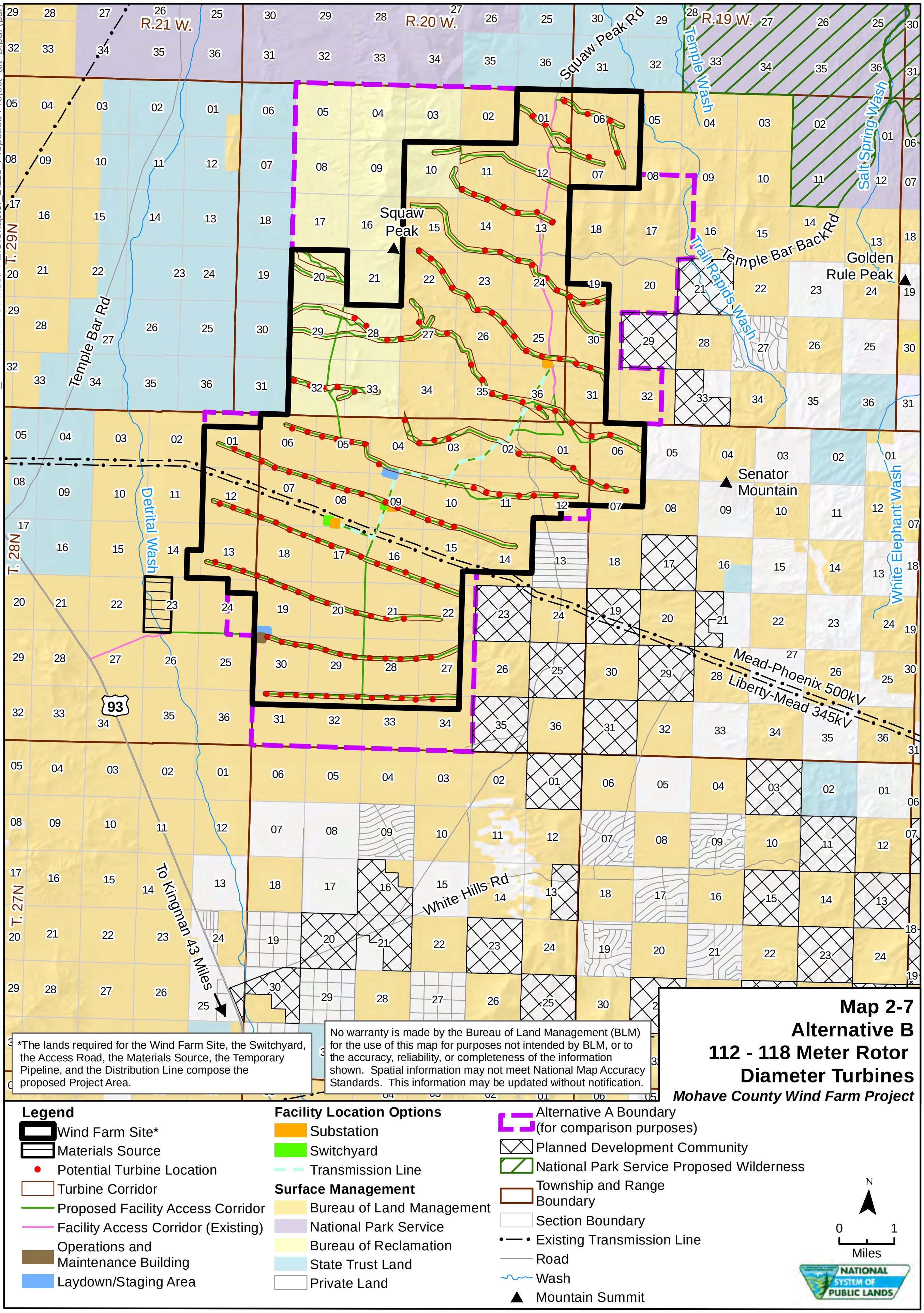
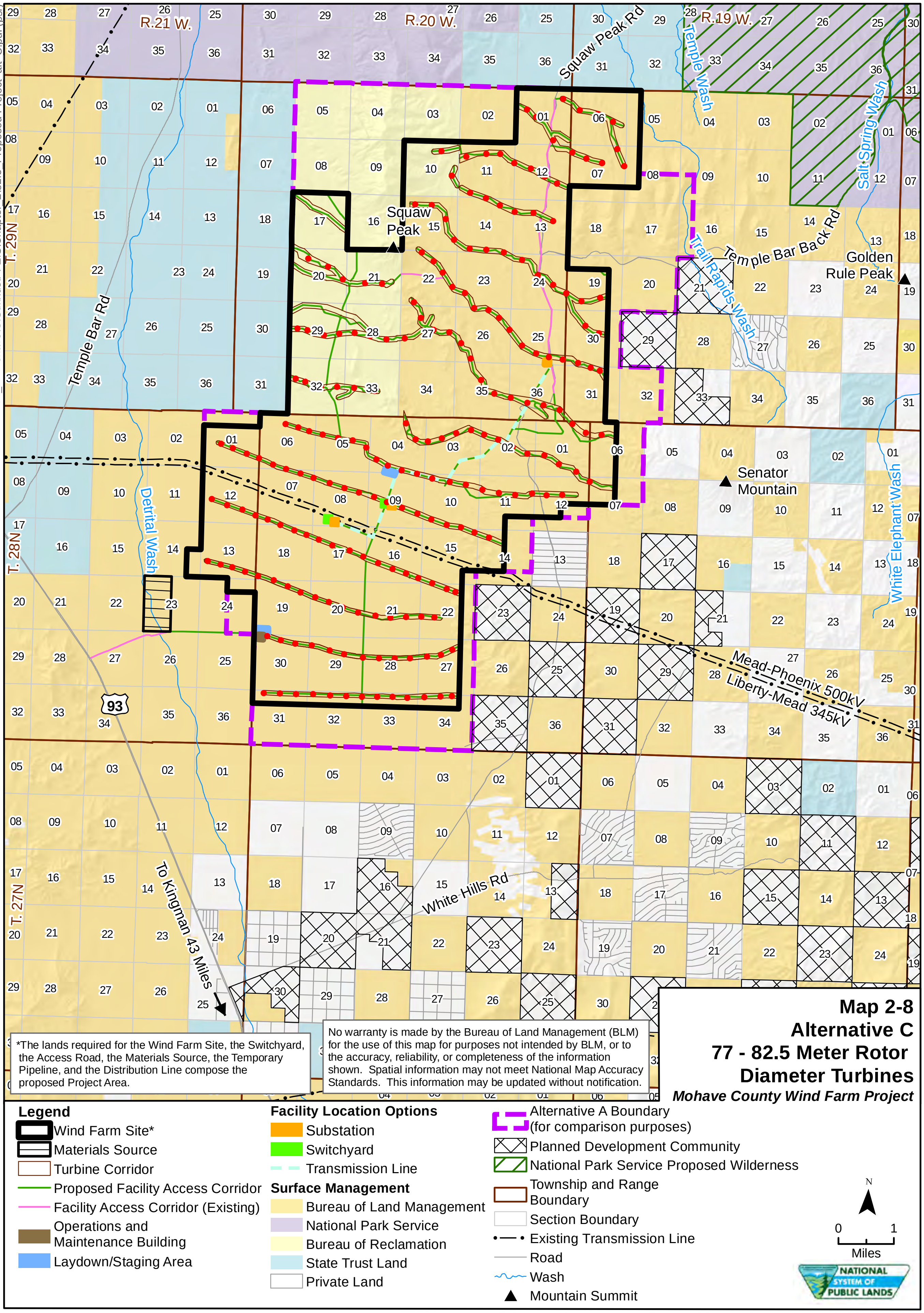


Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

2.6.4 Alternative C

Like Alternative B, BLM developed Alternative C to respond to concerns primarily identified by private land owners/residents and Lake Mead NRA. Alternative C is illustrated on Maps 2-8, 2-9, and 2-10 and is also a reduced footprint alternative. The Wind Farm Site would encompass approximately 30,178 acres of public land managed by the BLM and approximately 5,124 acres of land managed by Reclamation. As shown in Table 2-6, the number of turbines constructed would vary depending on the turbine type that is installed and the full range of micro-siting constraints, including sensitive natural and cultural resources, engineering, construction and safety considerations, but Alternative C could support development of 154-208 turbines, with an energy output from approximately 310 to 500 MW. The turbine layouts shown in Maps 2-8, 2-9 and 2-10 show a representative layout of the turbines, based on rotor diameter, within the corridors that might be considered with Alternative C. The specific turbine count and layout would be determined through micro-siting, which may include analysis of the physical constraints of the landscape, the strength of the wind resource, geotechnical testing results, and avoidance of waters of the U.S. and cultural resources, among other factors. Flexibility to place turbines within the corridors would be necessary in order to address specific engineering and environmental constraints identified through this EIS and during BLM's and Reclamation's review of construction plans prior to issuance of notices to proceed / right to use authorization with construction. Alternative C differs from Alternative B in that there would be one additional turbine corridor on Reclamation-administered land (in Township 29 North, Range 20 West, Sections 20-21), but the corridors on BLM-administered land shortened on the eastern side of the Wind Farm Site under Alternative B would be shortened even further to provide greater separation between the private lands and the nearest turbines. Other Project features would be comparable to those identified with Alternative A and as described in Section 2.5. All Project features options (turbine color, transmission line interconnection, and collector lines) would be considered as suitable options for Alternative C. Like Alternative B, methods to achieve the nameplate capacity with Alternative C could include use of more than one turbine type and alteration of the turbine spacing to generate the 425 or 500 MW of power needed to satisfy the interconnection request, while staying within the turbine corridors identified in the reduced land area. Given the range and complexity of the constraints to be considered prior to issuance of notices to proceed / right to use authorization, achieving even the minimum energy output of 310 MW for Alternative C could require turbine placement along the full extent of all of the corridors shown, if site constraints require avoidance of areas along the corridors. Nonetheless, the Project would still be required to meet the 425 MW or 500 MW interconnection requirements. Thus, Alternative C presents a greater risk than the Proposed Action that, if approved, the Project would not be commercially viable.



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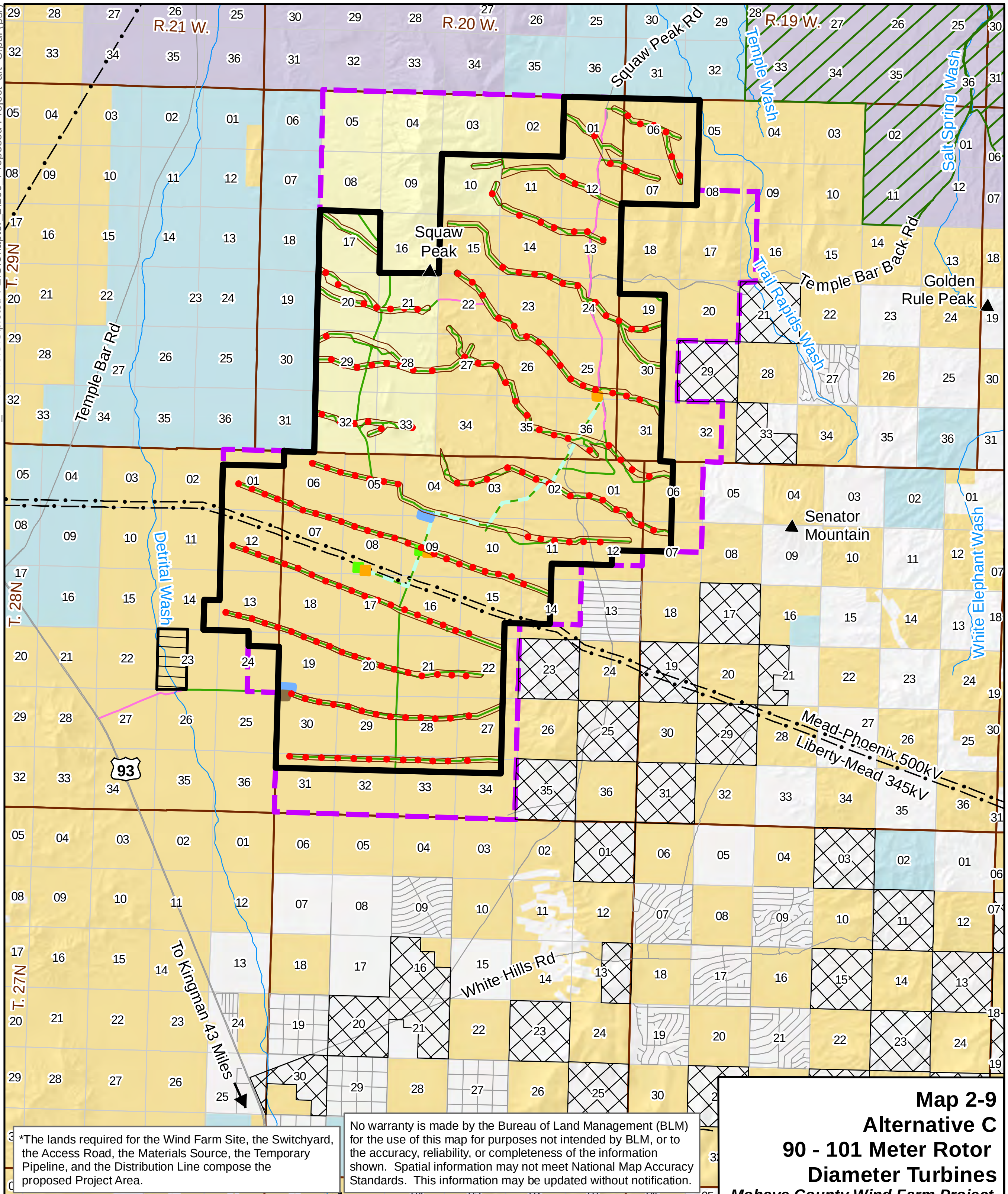

*The lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

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Map 2-9
Alternative C
90 - 101 Meter Rotor Diameter Turbines

Mohave County Wind Farm Project

Legend

- Wind Farm Site*
- Materials Source
- Potential Turbine Location
- Turbine Corridor
- Proposed Facility Access Corridor
- Facility Access Corridor (Existing)
- Operations and Maintenance Building
- Laydown/Staging Area

Facility Location Options

- Facility Location Options
- Switchyard
- Transmission Line

Surface Management

- Bureau of Land Management
- National Park Service
- Bureau of Reclamation
- State Trust Land
- Private Land

- Alternative A Boundary (for comparison purposes)
- Planned Development Community
- National Park Service Proposed Wilderness
- Township and Range Boundary
- Section Boundary
- Existing Transmission Line
- Road
- Wash
- Mountain Summit

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NATIONAL SYSTEM OF PUBLIC LANDS

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

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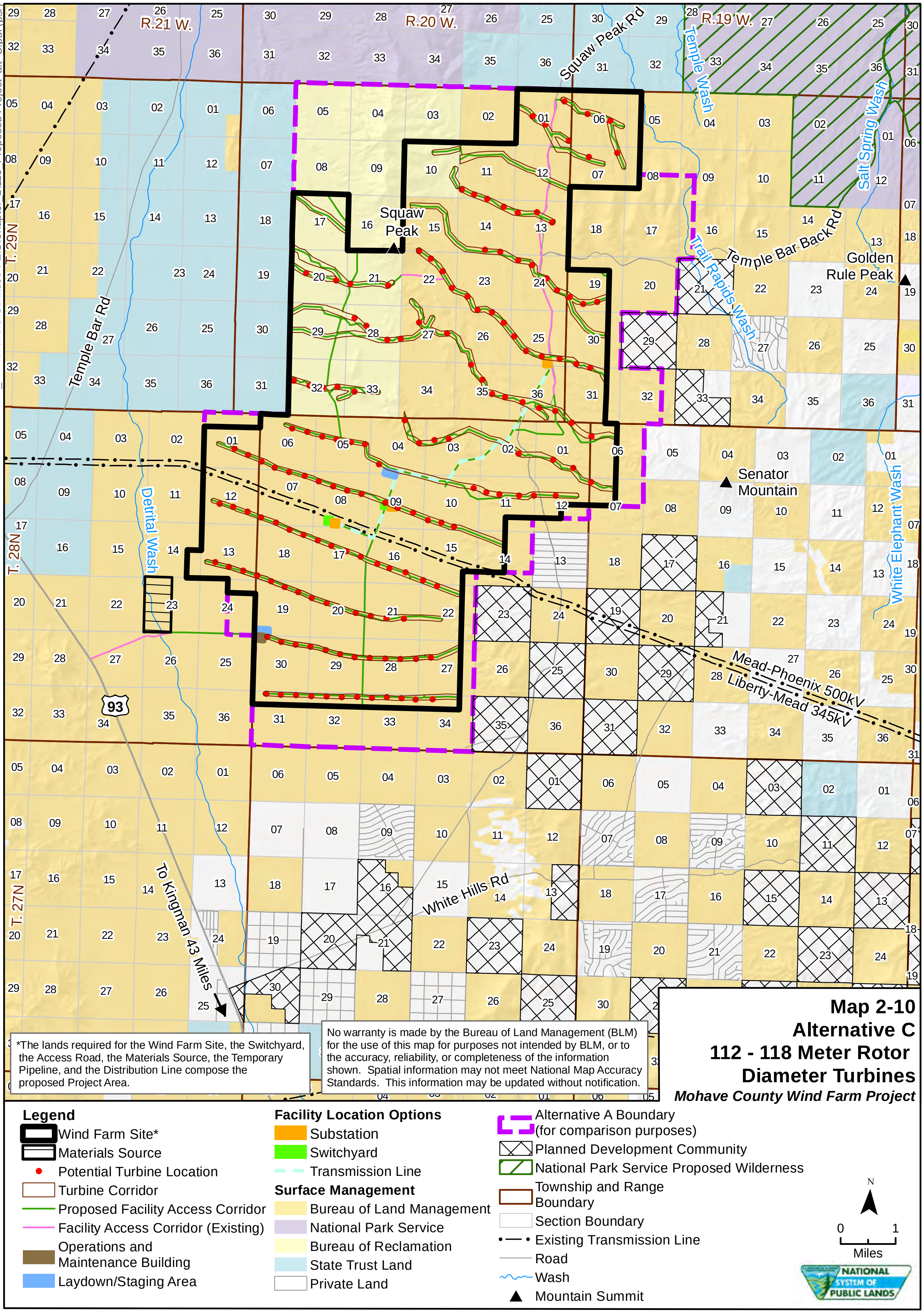

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

Like Alternatives A and B, BLM and Reclamation would grant ROWs to BP Wind Energy with Alternative C. BLM would grant a ROW to Western for the switchyard. Western would grant the request for interconnection to the 345-kV line or the Mead-Phoenix participants would grant interconnection with the 500-kV line, with Western designing, constructing, owning, and maintaining the switchyard in either case. Project components, activities, and associated ground disturbance impacts for Alternative C are summarized in Table 2-7.

Alternative C would meet BLM's purpose and need by allowing the use of Federal land to help meet projected energy demands. Alternative C supports the proposed actions needed by Reclamation and Western for the implementation of the Project by allowing the use of Reclamation-administered Federal land for renewable energy development and offering capacity on Western's transmission system or facilities to support transmission (of renewable energy) on the Mead-Phoenix line.

Refinements to the project description, together with additional engineering studies, have occurred since the Draft EIS was published. These changes result in revisions to the anticipated maximum acres of ground disturbance for some of the Project components. Table 2-8 shows where the estimated ground disturbance for Alternatives A, B, and C changed by showing the estimate from the Draft EIS in *black italicized* text and the current estimate in **red bold** text. No values are shown where there was no change. Alternative E, the Agencies' Preferred Alternative, was not determined until the agencies had an opportunity to review all public comments on the Draft EIS and to continue consultations with other agencies with regulatory authority, such as the State Historic Preservation Office and coordination with the U.S. Fish and Wildlife Service. Consequently, all values for the anticipated maximum acres of ground disturbance for Alternative E shown in Table 2-7 are newly reported.

Table 2-7 Anticipated Maximum Ground Disturbance in Acres for Alternatives A, B, C, and E

Project Component	Impact Area	Alternative A				Alternative B				Alternative C				Alternative E, Agencies' Preferred Alternative			
		BLM		Reclamation		BLM		Reclamation		BLM		Reclamation		BLM		Reclamation	
		Temp	Long-term	Temp	Long-term	Temp	Long-term	Temp	Long-term	Temp	Long-term	Temp	Long-term	Temp	Long-term	Temp	Long-term
Two temporary Laydown/Staging Areas and associated facilities such as parking area and temporary concrete batch plant	First laydown area = 20 acres; second laydown area = 10 acres; each laydown area would have 1 additional acre for soil stockpiling = 32 acres total	32	0	0	0	32	0	0	0	32	0	0	0	32	0	0	0
Wind turbines, including pad-mounted transformer	1.85 to 2.5 acres temporary disturbance per turbine; 0.065 permanent disturbance per turbine	483	14	78	2	392	12	33	1	376	11	48	1	455	14	30	1
Two Substations	Up to 5 acres per substation	10	10	0	0	10	10	0	0	10	10	0	0	10	10	0	0
Transmission Line to Switching Station Interconnecting to Mead-Phoenix 500-kV line or Interconnecting to Liberty-Mead 345-kV line	Temporary disturbance is based on 8 support structures per mile with a 100-foot radius per pole and permanent disturbance is based on 8 structures per mile with a 6-foot radius per structure	35	0.1	0	0	35	0.1	0	0	35	0.1	0	0	35	0.1	0	0
Road along transmission line	Assumes 20-foot width for construction and retained for O&M	15	15	0	0	15	15	0	0	15	15	0	0	15	15	0	0
Switching Station for an interconnection to Liberty-Mead 345-kV line	Approximately 11 acres for construction; fenced area of approximately 600x600 feet	11	8	0	0	11	8	0	0	11	8	0	0	11	8	0	0
Switching Station for an interconnection to Mead-Phoenix 500-kV line	Up to 18 acres for construction; fenced area of approximately 650x750 feet	18	10	0	0	18	10	0	0	18	10	0	0	18	10	0	0
Operations and Maintenance Building and associated facilities such as parking	Up to 5 acres	5	5	0	0	5	5	0	0	5	5	0	0	5	5	0	0
Improvements to Existing Roads, including collector line trenches and any utility or communication lines to the O&M building	56- to 136-foot-width development area for collector roads; 56-foot-width maximum development area for other roads; 20-foot width for long-term use roads (assumes existing road width of 20 feet or 2.5 acres of existing disturbance per mile)	47	0	0	0	38	0	0	0	41	0	0	0	38	0	0	0
Development of New Access Roads, including collector line, utility lines, communication lines, and crane paths	56- to 136-foot-width development area for collector roads; 56-foot-width maximum development area for other roads; 20-foot width for permanent roads.	610	202	148	51	521	172	76	27	520	170	104	37	563	185	60	21
Development of Access Road from US 93 to Wind Farm Site	56-foot-width maximum development area; 36-foot-width permanent road	14	8	0	0	17	10	0	0	17	10	0	0	14	8	0	0
Temporary Met Towers (assumes 23 total, including potential power curve testing, if required)	1.6 acres temporary disturbance; no long-term disturbance	30.4	0	6.4	0	30.4	0	6.4	0	30.4	0	6.4	0	30.4	0	6.4	0
Permanent Met Towers (assumes up to 4)	1.6 acres temporary disturbance; 0.03 acre permanent disturbance	4.8	0.09	1.6	0.03	4.8	0.09	1.6	0.03	4.8	0.09	1.6	0.03	4.8	0.09	1.6	0.03
	TOTAL (with 500-kV switchyard)	**1303**	**263**	**234**	**54**	**1117**	**233**	**117**	**28**	**1104**	**231**	**160**	**38**	**1219**	**246**	**98**	**22**
	TOTAL (with 345-kV switchyard)	**1296**	**262**	**234**	**54**	**1111**	**231**	**117**	**28**	**1097**	**229**	**160**	**38**	**1212**	**244**	**98**	**22**

NOTE: The acres of disturbance by Project element are conservative estimates based on available information in the planning stage of the Project. This estimate of the disturbance for each Project element could vary based on final design plan; however, the total amount of ground disturbance would not be greater than these conservative estimates should the Project be approved.

Table 2-8 Changes in Anticipated Maximum Acres of Ground Disturbance since the Draft EIS

Project Components	Nature of the Change	Why was there a change?	Alternative A				Alternative B				Alternative C			
			BLM		Reclamation		BLM		Reclamation		BLM		Reclamation	
			Temp	Long-term	Temp	Long-term	Temp	Long-term	Temp	Long-term	Temp	Long-term	Temp	Long-term
Two temporary Laydown/Staging Areas and associated facilities such as parking area and temporary concrete batch plant	One laydown area increased from 10 to 20 acres; 1 additional acre for each laydown area allocated for stockpiling soil during preparations for the laydown area	The size of the primary laydown/staging area near the access road from US 93 was underestimated; space for stockpiled soil was not previously considered.	*20* **32**				*20* **32**				*20* **32**			
Wind turbines, including pad-mounted transformer	None	More precise calculation resulted in a different rounding error		*15* **14**										*2* **1**
Transmission Line to Switchyard Interconnecting to Mead-Phoenix 500-kV line or Interconnecting to Liberty-Mead 345-kV line	No change to the temporary disturbance is based on 8 support structures per miles with a 100-foot radius per pole; long-term the disturbance would be based on 8 structures per mile but with a 6-foot radius per structure.	Revised to reflect updated mileage for the transmission line.	*29* **35**				*29* **35**				*29* **35**			
Road along transmission line	No change; assumes 20-foot width for construction and retained for O&M	No change, but this was not reported in the Draft EIS	**15**	**15**	**0**	**0**	**15**	**15**	**0**	**0**	**15**	**15**	**0**	**0**
Switchyard for an interconnection to Liberty-Mead 345-kV line	Construction are of 700x700 feet; fenced area of approximately 600x600 feet	More precise calculation resulted in a different rounding error	*12* **11**				*12* **11**				*12* **11**			
Switchyard for an interconnection to Mead-Phoenix 500-kV line	Western confirmed switchyard would be smaller than first reported with a fenced area of approximately 650x750 feet	Original estimate of switchyard size was overstated	*37* **18**	*31* **10**			*37* **18**	*31* **10**			*37* **18**	*31* **10**		
Improvements to Existing Roads, including collector line trenches and any utility or communication lines to the O&M building	Roads between the turbine corridors include collector lines that parallel the road; these roads were originally estimated to have 56 feet of temporary disturbance and are now estimated to vary between 56 feet and 136 feet	Collector lines have limitations on the amount of power they can carry before a new collector line is needed; each set of collector lines needs to be buried in a separate trench for safety, heat dissipation, etc. This was not considered in the Draft EIS	*20* **47**				*18* **38**				*18* **41**			
Development of New Access Interior Roads, including collector line, utility lines, communication lines, and crane paths	Roads between the turbine corridors include collector lines that parallel the road; these roads were originally estimated to have 56 feet of temporary disturbance and are now estimated to vary between 56 feet and 136 feet	Collector lines have limitations on the amount of power they can carry before a new collector line is needed; each set of collector lines needs to be buried in a separate trench for safety, heat dissipation, etc. This was not considered in the Draft EIS	*540* **610**	*185* **202**	*176* **185**	*62* **65**	*485* **521**	*163* **172**	*81* **76**	*29* **27**	*463* **520**	*155* **170**	*95* **104**	*33* **37**
Development of Access Road from US 93 to Wind Farm Site	56-foot-width maximum development area; 36-foot-width permanent road		*31* **14**	*19* **11**			*31* **17**	*19* **13**			*31* **17**	*19* **13**		
Permanent Met Towers	It is now estimated that 4 rather than 3 permanent met towers may be needed	Increase in permanent met towers; long-term disturbance on BLM was erroneously calculated at 0.3 acre rather than 0.03 acre in the Draft EIS	*3.2* **4.8**	*1.6* **0.09**	*0.06* **1.6**		*3.2* **4.8**	*1.6* **0.09**	*0.06* **1.6**		*3.2* **4.8**	*1.6* **0.09**	*0.06* **1.6**	
	TOTAL (with 500-kV switchyard) **TOTAL (with 345-kV switchyard)**		***1303*** ***1296***	***267*** ***265***	***271*** ***271***	***67*** ***67***	***1117*** ***1111***	***237*** ***235***	***117*** ***117***	***28*** ***28***	***1104*** ***1097***	***234*** ***233***	***160*** ***160***	***38*** ***38***

2.6.5 Alternative D – No Action

Alternative D is the no action alternative, which provides a baseline against which action alternatives can be compared. Alternative D includes an analysis of effects from not developing the Project. Under Alternative D the Project, including the wind farm and all associated components and facilities, would not be built. Alternative D assumes that no actions associated with the Project would occur, and no ROWs or interconnections would be granted. The BLM-administered public lands would continue to be managed in accordance with the Kingman RMP and the Reclamation-administered lands would continue to be managed by Reclamation. The need would not be met for the agencies to respond to BP Wind Energy North America's application to develop the wind farm and to interconnect with Western's transmission system, through the established application processes of both agencies. Capacity on Western's transmission lines would remain available for other projects.

Alternative D would not support the BLM's management objective to increase renewable energy production on public lands per the Energy Policy Act (EPAct); support BLM's Wind Energy Development Policy for increasing renewable energy production on BLM-administered public lands; or respond to the projected demand for energy described in the EPAct. However, taking no action on the Project would not preclude the opportunity for other renewable energy projects to be considered.

2.6.6 Alternative E – Agencies' Preferred Alternative

The Council on Environmental Quality regulations at Title 40 CFR 1502.14(e) direct that an EIS must identify the agency's preferred alternative. BLM and the cooperating agencies elected to consider all public comments on the Draft EIS before identifying a preferred alternative. In addition to considering the public and agency input, additional information on golden eagle use within the Project Area emerged during 2012 biological surveys. These data indicated a need to establish a no-build area and curtailment zone to reduce potential impacts on golden eagles within the Squaw Peak breeding area in the northwest portion of the Wind Farm Site. As a result, Alternative E was established with the rationale focused on (1) coordination among the U.S. Fish and Wildlife Service (USFWS), BLM, Reclamation, and Arizona Game and Fish Department (AGFD) regarding concerns for golden eagle breeding areas, (2) concerns for visual and noise impacts on Lake Mead NRA, and (3) concerns for visual and noise impacts on existing residences. With Alternative E, the Wind Farm Site would consist of approximately 35,329 acres of BLM-administered land and approximately 2,781 acres of Reclamation-administered land. The number of turbines constructed would vary depending on the turbine type that is installed and the full range of micro-siting constraints, including sensitive natural and cultural resources, engineering, construction and safety considerations, but Alternative E could support development of 179 turbines, and no more than 243 turbines would be installed with this alternative, with an energy output from approximately 364 (assuming all phased corridors are constructed) to 500 MW.

The BLM and Reclamation have selected the preferred alternative based on the analysis in this EIS, consideration of public comments, and the golden eagle survey data. Alternative E, the Agencies' Preferred Alternative, is the alternative that best fulfills each agency's statutory mission and responsibilities, considering economic, environmental, technical, and other factors.

The preferred alternative is a preliminary indication of the federally responsible official's preference for action. In accordance with NEPA (40 CFR §1502.14(e)), the BLM and Reclamation have determined that the preferred alternative is a combination of Alternatives A and B. Map 2-11, 2-12, and 2-13 illustrate Alternative E, the Agencies' Preferred Alternative, with the proposed turbine layout for each of the different sizes of turbines that may be selected by BP Wind. Based on the Wind Farm Site boundaries associated with Alternative E, it is currently anticipated that turbines with a lower generation capacity (such as turbines with a 77- to 82.5-meter rotor diameter and some turbines in the 90-100 meter range) could not meet the level of generation proposed by BP Wind Energy in their interconnection application to Western, because the output would only be in the 300 MW range. If the Project is built in phases with a combination of small and large output capacity turbines or if turbine technology improves, the turbine layout shown in Map 2-11 may be feasible in the future.

Alternative E does not require supplementation because it does not represent a substantial change in the proposed action that is relevant to environmental concerns per 40 CFR § 1502.9(c)(1)(i). Instead, this alternative is a mix of Alternatives A and B, and therefore, is within the spectrum of the alternatives already analyzed in the Proposed Mojave County Wind Farm Project Draft EIS [40 CFR § 1502.9(c)(1)(i)-(ii); see also BLM's H-1790-1 "National Environmental Policy Handbook" at 29 (January 2008)]. The impacts associated with the construction, operation, maintenance, and decommissioning of wind turbines within the corridors identified in this alternative are fully disclosed and analyzed in the EIS in Chapter 4.

Under Alternative E, similar to Alternative B, several of the turbine corridors in the northwest corner of the Wind Farm Site would be excluded from the Project Area in Township 29 North, Range 20 West (see Maps 2-11 to 2-13). Also similar to Alternative B, turbine corridors would be excluded from Sections 17 and 18 of Township 29 North, Range 19 West. Alternative E would allow use of the corridors in Township 29 North, Range 20 West, Sections 28 and 29 only if the generation capacity requirements cannot be satisfied by building in the corridors with no development restrictions. Consistent with Alternative A and B, Alternative E would provide for a minimum of ¼ mile between private property boundaries and the nearest turbine. Like Alternative A, the southernmost turbine corridor in the Wind Farm Site would be available, but only if needed to meet the generation capacity requirements identified in the interconnection agreement with Western.

Recent surveys identified an active golden eagle nest in the northwest corner of the Wind Farm Site. BP Wind Energy, in coordination with USFWS, has prepared an ECP/BCS in accordance with the USFWS Draft Eagle Conservation Plan Guidance for the development of Eagle Conservation Plans, and BLM IM 2010-156, which provides direction for compliance under the Bald and Golden Eagle Protection Act. The ECP/BCS summarizes the environmental conditions at the Project, avian studies conducted and their results, potential impacts to eagles and non-eagle bird species, avoidance and minimization elements, and compensatory mitigation for unavoidable impacts of the Mohave County Wind Farm. As a result of the coordination with USFWS, BP Wind Energy has agreed to establishing a 1.25-mile avoidance/no-build area encompassing the nest and forage area west of the active nest, and agreed to establish a curtail operation zone (see avoidance area on Maps 2-11 to 2-13).

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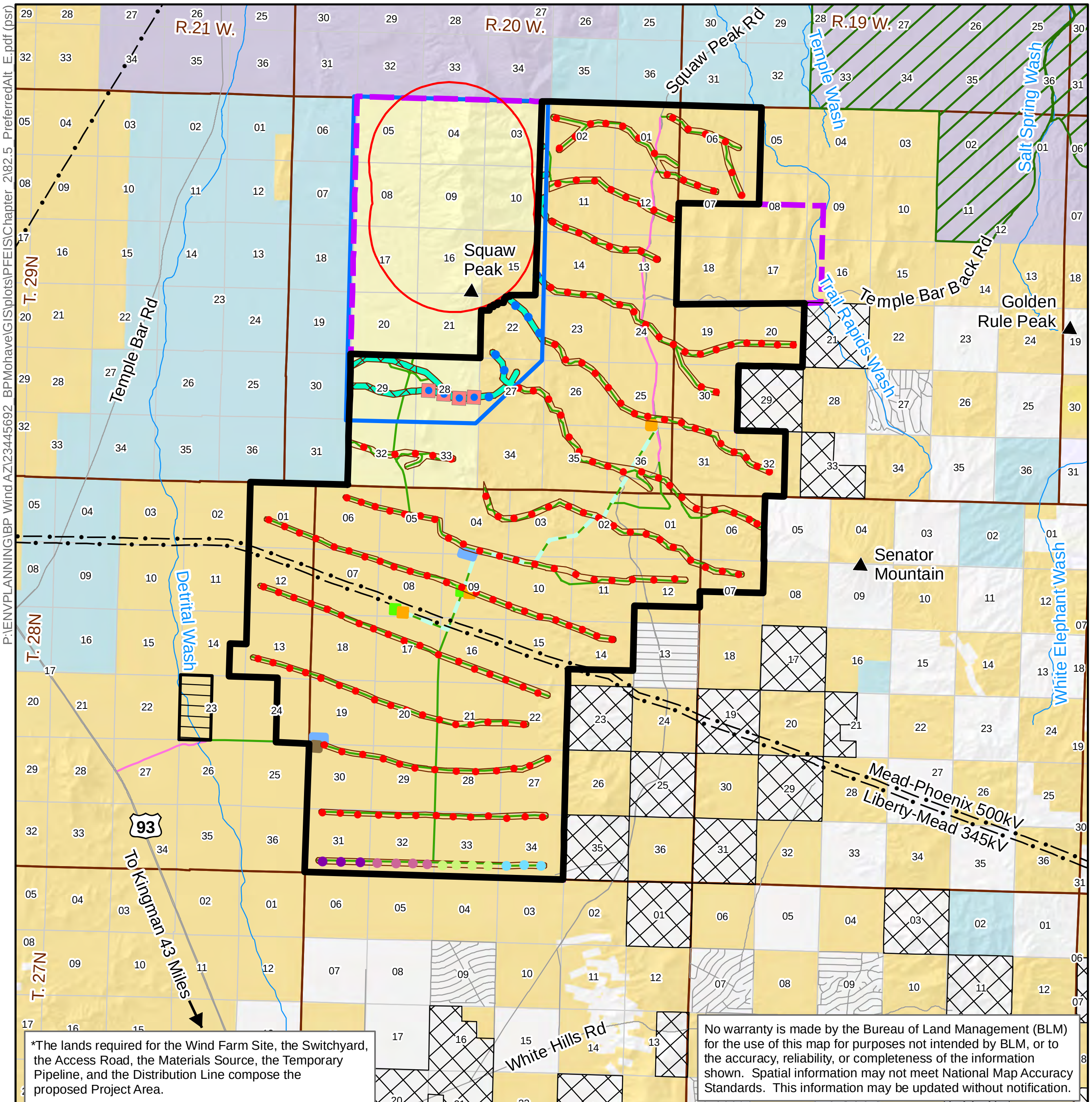


Legend

- Wind Farm Site*
- Materials Source
- Eagle Nest Avoidance Area
- Curtailed Operations Area
- Turbine Corridor
- Curtailed Corridor
- Proposed Facility Access Corridor
- Facility Access Corridor (Existing)
- Proposed Turbine Location
- Turbine with Curtailed Operation

If Needed to Meet Generation Capacity

- Turbine with Curtailed Operation First Phase
- Corridor within Curtailment Zone Second Phase
- Turbine Third Phase
- Turbine Fourth Phase
- Turbine Fifth Phase
- Turbine Sixth Phase
- Operations and Maintenance Building
- Laydown/Staging Area

Facility Location Options

- Substation
- Switchyard
- Transmission Line

Surface Management

- Bureau of Land Management
- National Park Service
- Bureau of Reclamation
- State Trust Land
- Private Land

- Alternative A Boundary (for comparison purposes)
- Planned Development Community
- National Park Service Proposed Wilderness
- Township and Range Boundary
- Section Boundary
- Existing Transmission Line
- Road
- Wash
- Mountain Summit

Map 2-11
Alternative E
Preferred Alternative
77 - 82.5 Meter Rotor
Diameter Turbines

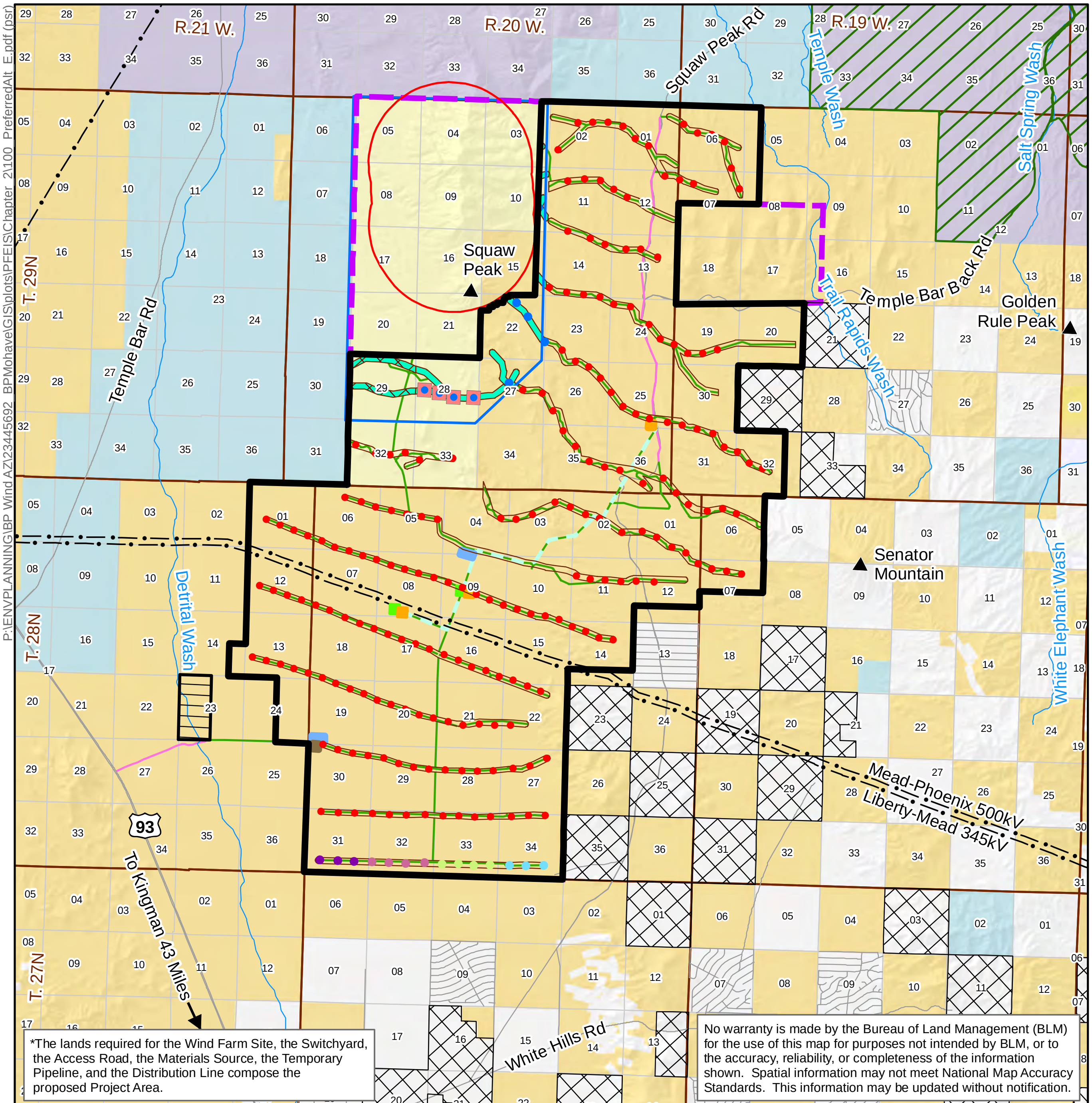
Mohave County Wind Farm Project

N

0 1
Miles

NATIONAL SYSTEM OF PUBLIC LANDS

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)



Legend

- Wind Farm Site*
- Materials Source
- Eagle Nest Avoidance Area
- Curtailed Operations Area
- Turbine Corridor
- Curtailed Corridor
- Proposed Facility Access Corridor
- Facility Access Corridor (Existing)
- Proposed Turbine Location
- Turbine with Curtailed Operation

If Needed to Meet Generation Capacity

- Turbine with Curtailed Operation First Phase
- Corridor within Curtailment Zone Second Phase
- Turbine Third Phase
- Turbine Fourth Phase
- Turbine Fifth Phase
- Turbine Sixth Phase
- Operations and Maintenance Building
- Laydown/Staging Area

Facility Location Options

- Substation
- Switchyard
- Transmission Line

Surface Management

- Bureau of Land Management
- National Park Service
- Bureau of Reclamation
- State Trust Land
- Private Land

- Alternative A Boundary (for comparison purposes)
- Planned Development Community
- National Park Service Proposed Wilderness
- Township and Range Boundary
- Section Boundary
- Existing Transmission Line
- Road
- Wash
- Mountain Summit

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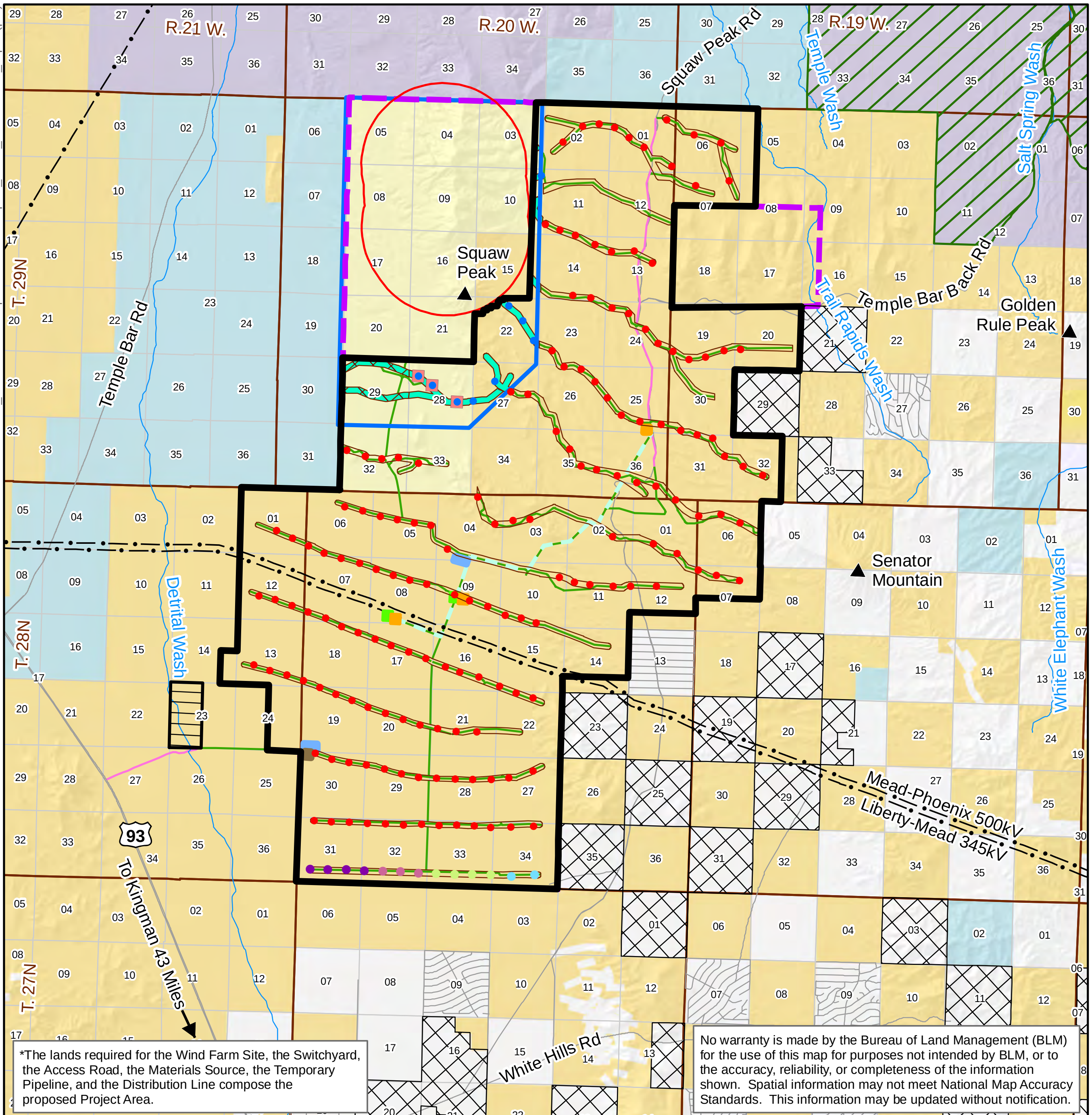
0 1
Miles

NATIONAL SYSTEM OF PUBLIC LANDS

Map 2-12
Alternative E
Preferred Alternative
90 - 101 Meter Rotor Diameter Turbines

Mohave County Wind Farm Project

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)



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Legend

- Wind Farm Site*
- Materials Source
- Eagle Nest Avoidance Area
- Curtailed Operations Area
- Turbine Corridor
- Curtailed Corridor
- Proposed Facility Access Corridor
- Facility Access Corridor (Existing)
- Proposed Turbine Location
- Turbine with Curtailed Operation

If Needed to Meet Generation Capacity

- Turbine with Curtailed Operation First Phase
- Corridor within Curtailment Zone Second Phase
- Turbine Third Phase
- Turbine Fourth Phase
- Turbine Fifth Phase
- Turbine Sixth Phase
- Operations and Maintenance Building
- Laydown/Staging Area

Facility Location Options

- Substation
- Switchyard
- Transmission Line

Surface Management

- Bureau of Land Management
- National Park Service
- Bureau of Reclamation
- State Trust Land
- Private Land

- Alternative A Boundary (for comparison purposes)
- Planned Development Community
- National Park Service Proposed Wilderness
- Township and Range Boundary
- Section Boundary
- Existing Transmission Line
- Road
- Wash
- Mountain Summit

N

0 1 Miles

NATIONAL SYSTEM OF PUBLIC LANDS

Map 2-13
Alternative E
Preferred Alternative
112 - 118 Meter Rotor Diameter Turbines
Mohave County Wind Farm Project

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

The combined 1.25-mile no build buffer area and surrounding curtailment zone was identified in coordination with the USFWS, BLM, Reclamation, and AGFD to extend about1.5 miles east and about 3.3 miles south and southwest of the active nest (see Maps 2-11 to 2-13). The curtailment program modifies turbine operations around Squaw Peak within the existing curtailment zone when specific criteria are met to start and stop curtailment within the five-year period after operation that corresponds to the current duration of eagle take permits available. Specifically, curtailment within the existing curtailment zone would start once the Squaw Peak breeding area is occupied, as defined by meeting at least one of the five criteria described in Section 8.9.1.1 of the ECP based on occupancy surveys. After occupancy of the Squaw Peak breeding areas is determined, then curtailment of turbines within the existing curtailment zone will occur. Curtailment of turbines would occur daily from (1) 11:00 a.m. to 4:00 p.m. between December 1 and March 15, and (2) from 4 hours after sunrise until 2 hours before sunset beginning March 16 and continuing until either the earlier of when of the biological criteria discussed below is met, or September 30. This timing corresponds to the approximate peak period of flight activity of golden eagles in northeastern Arizona and northwestern New Mexico, as determined by satellite telemetry (R. Murphy, USFWS, unpublished telemetry data), but extends during mid-winter to account for the peak of courtship and territorial display activity by breeding adults. Curtailment will end before September 30 when one of the biological criteria occurs as described in Section 8.9.1.4 of the ECP, including (1) there is no active nest by the end of April, or (2) there was an active nest but it was determined to have failed, or (3) two months post-fledging or less if fledglings have left the area sooner than two months based on occupancy and eagle use surveys. If none of the biological criteria has been met, curtailment will end no later than September 30. Adaptive management will occur throughout the five year period to evaluate the curtailment program within the existing curtailment zone based on the criteria described in Sections 8.9.1 of the ECP. At least three years of eagle use data would be collected prior to considering any relaxation of the spatial extent or proposed timing of curtailment within the existing curtailment zone. These curtailment requirements and no-build areas are expected to avoid and minimize impacts to eagles by reducing collision risk as well as by reducing the potential disturbance to eagles actively nesting in the Squaw Peak breeding area.

In addition to protecting golden eagles, prohibiting construction in the northwest corner of the Wind Farm Site also would reduce the visual and noise impacts on Lake Mead NRA, particularly for visitors accessing the recreation area from the Temple Bar entrance station and for persons recreating on the NPS lands adjacent to the Wind Farm Site. To further protect the scenic views from Lake Mead NRA, the Alternative E excludes construction in Township 29 North, Range 19 West, Sections 17 and 18. Under Alternative A, the turbine corridors in these sections were positioned along ridge lines so the turbines would be prominent and visible from distant locations, including from a Proposed Wilderness within Lake Mead NRA.

Alternative E would provide for a minimum of ¼ mile between private property and the nearest turbine corridor. While existing residences on the developed private property would be more than a mile from the nearest turbine corridor, BLM and Reclamation recognize that some homes in the area were established before the Wind Farm Site was proposed and that the residents would experience constant exposure to the views of the nearest turbines, and could be exposed to more noise during certain wind conditions if the Project were constructed. Consequently, BLM and Reclamation would only allow turbines in Alternative E's southernmost corridor if BP Wind Energy could not otherwise meet the nameplate generation capacity that is required per their interconnection request with Western.

The BLM and Reclamation have worked with BP Wind Energy to develop a priority order for phasing construction of turbines to meet the generation requirements with Alternative E. First, efforts must be made to meet the generation capacity requirements using the proposed turbine corridors with red dots representing turbine locations on Maps 2-11 to 2-13, but with consideration given to the parameters of manufacturer requirements for turbine placement, other setback requirements, and agreements to mitigate environmental effects through micro-siting to avoid sensitive resources within the corridors and address engineering, construction and safety constraints. Only if generation capacity cannot be achieved through development of these turbine corridors, turbines could be constructed in Sections 28 and 29 of Township 29 North, Range 20 West (first and second phase) within the eagle curtailment buffer area (blue corridors on Maps 2-11 to 2-13). Finally, only if nameplate generation capacity still could not been met, would development of the southernmost turbine corridor be allowed, starting with Township 28 North, Range 20 West, Section 31, followed by Section 32, 34 and lastly Section 33 (third to sixth phases, see Maps 2-11 to 2-13). A Notice to Proceed / right to use authorization is required for the land management agency (Reclamation or BLM, as applicable) prior to initiating development of each phase.

As described in Section 2.6.1, there are three project options. Two of these, the turbine type and the interconnection to the power grid, would be determined by the proponent based on power purchase agreements, availability of turbines at the time of construction, satisfying interconnection agreements, and other similar factors. For the third project option, turbine color, Alternative E is a light gray turbine, comparable to RAL 7035, used throughout the Project. The light gray color is expected to result in less visual contrast than a white turbine, while meeting the FAA's requirements for marking and lighting.

The Wind Farm Site with Alternative E would consist of approximately 35,329 acres of BLM-administered land and approximately 2,781 acres of Reclamation-administered land, which equates to 4,457 more acres of BLM land and 1,067 fewer acres of Reclamation land than Alternative B. Compared with Alternative B, Alternative E would have about 83 acres (7 percent) more temporary ground disturbance (106 acres more on BLM land, but 19 acres less on Reclamation land) and 7 acres (3 percent) more long-term ground disturbance (17 acres more on BLM land, but 6 acres less on Reclamation land). Compared with Alternative A, Alternative E would have about 220 acres (14 percent) less temporary ground disturbance, and 49 acres (15 percent) less long-term ground disturbance. Project components, activities, and associated ground disturbance impacts for Alternative E are summarized in Table 2-7.

Under Alternative E, there may be less potential for risk of golden eagle impacts due to the curtailment program and the no-build area (see Maps 2-11 to 2-13). The curtailment zone and 1.25 mile no-build buffer may reduce impacts relative to B by reducing collision risk and potential disturbance to eagles actively nesting in the Squaw Peak breeding area. Alternative E would have fewer turbines constructed within the Wind Farm Site in areas with topographic features that create wind conditions that are favorable for use by golden eagles (USFWS 2011, Tetra Tech 2012). The no-build buffer area under Alternative E reduces impacts relative to Alternative B because the distance from known golden eagle nests to the nearest turbine corridor increases from 0.9 miles under Alternative B to 1.3 miles (Tetra Tech 2012). As previously noted, the curtailment program would modify turbine operations around Squaw Peak within the Alternative E curtailment zone during specified time periods of the breeding season.

Land use, visual, and noise effects generally would be comparable to Alternative B, with a few exceptions briefly noted here and described in Chapter 4. Effects on land use within the Wind Farm Site would be comparable to Alternative B, but the effects beyond the Wind Farm Site would be more comparable to those described for Alternative A because the setback distances of turbine corridors to private property would be very similar to Alternative A. Visual and noise effects also would be comparable to Alternative B with the exception that Alternative E would retain the turbine corridors in Township 29 North, Range 20 West, Section 2 (see Maps 2-11 to 2-13). Turbines built within the corridors in this section would be visible from the southern areas of Lake Mead NRA near the Wind Farm Site. Visual effects from private property east of the Wind Farm Site would be similar to those described for Alternative A because the setback distances would be the same, but the elimination of turbine corridors in Township 29 North, Range 19 West, Sections 17 and 18 with Alternative E would reduce the visual impacts from some viewpoints. The visual effects would be the same as Alternative A if the southernmost turbine string is constructed and similar to alternative B if the southern turbine string is not constructed.

The extra turbines in Section 2 would be expected to result in occasional Project operational noise levels that exceed 35 dBA L_{eq} within Lake Mead NRA, depending on turbine layout, wind speed, and wind direction. Noise effects on private property would be similar to Alternative A if the southern string were built (see Chapter 4, Section 4.15.2), but similar to Alternative B if the southern string were not built (see Chapter 4, Section 4.15.3).

Given the range and complexity of the constraints to be considered prior to issuance of notices to proceed / right to use authorization, achieving even the minimum energy output of 364 MW for Alternative E could require turbine placement within the full extent of all of the corridors, if site constraints require avoidance of areas within the corridors. Nonetheless, the Project would still be required to meet the 425 MW or 500 MW interconnection requirements. Thus, Alternative E presents a greater risk than the Proposed Action that, if approved, the Project would not be able to meet the requirements of the interconnection and thus would put at risk the timing and commercially viability of the Project. This risk is less than Alternatives B or C.

2.7 PROJECT DESIGN REFINEMENTS

Surface disturbance locations and acreages identified in this EIS are based on a preliminary level of engineering and represent a reasonable maximum disturbance amount anticipated for construction, operation, maintenance, and decommissioning of the Project, including all ancillary facilities. However, due to possible Project refinement during construction, locations for turbines, roads, buried cables, overhead electric lines, and other Project features and alignments may change slightly to enhance safety, minimize environmental disturbance, and better accommodate on-the-ground situations. This may also result in changes to the acreages of anticipated disturbance. The estimated areas of disturbance presented in this EIS are conservative and are listed as the estimated maximum size, thus generally covering more acres than would be required for the proposed facilities. This serves to disclose a greater degree of environmental impact than is likely to occur. Given the range and complexity of the constraints to be considered prior to issuance of notices to proceed / right to use authorization, achieving even the minimum energy output of approximately 310-364 MW for Alternatives B, C and E could require turbine placement along the full extent of all of the corridors shown for each alternative, if site constraints require avoidance of areas within the corridors. Nonetheless, the Project would still be required to meet the 425 MW or 500 MW interconnection requirements. Thus, Alternatives B, C and E presents a greater risk than Alternative A that, if approved, the Project would not be able to meet the requirements of the interconnection and thus would put at risk the timing and commercially viability of the Project.

If Project design refinements required Project features beyond the areas defined in this EIS, additional actions to comply with environmental regulations likely would be required, and potentially could require additional NEPA depending on the nature of the refinements. Where work is required outside the turbine corridors, road corridors, utility corridors, or other specifically evaluated areas of ground disturbance, additional biological and cultural resource evaluations would be performed to ensure the refinements would not result in an adverse effect after the application of appropriate BMPs or other mitigation measures. A variance process, defined in the Compliance and Monitoring Plan, would be used to approve minor project refinements.

2.8 BONDING

BP Wind Energy would post BLM-required security for the Project to ensure compliance with the terms and conditions of the ROW authorization, including the estimated costs of reclamation and decommissioning, and the requirements of applicable regulations. The amount of the security bond would be based on the number of turbines and site-specific and Project-specific factors (BLM 2008a).

2.9 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

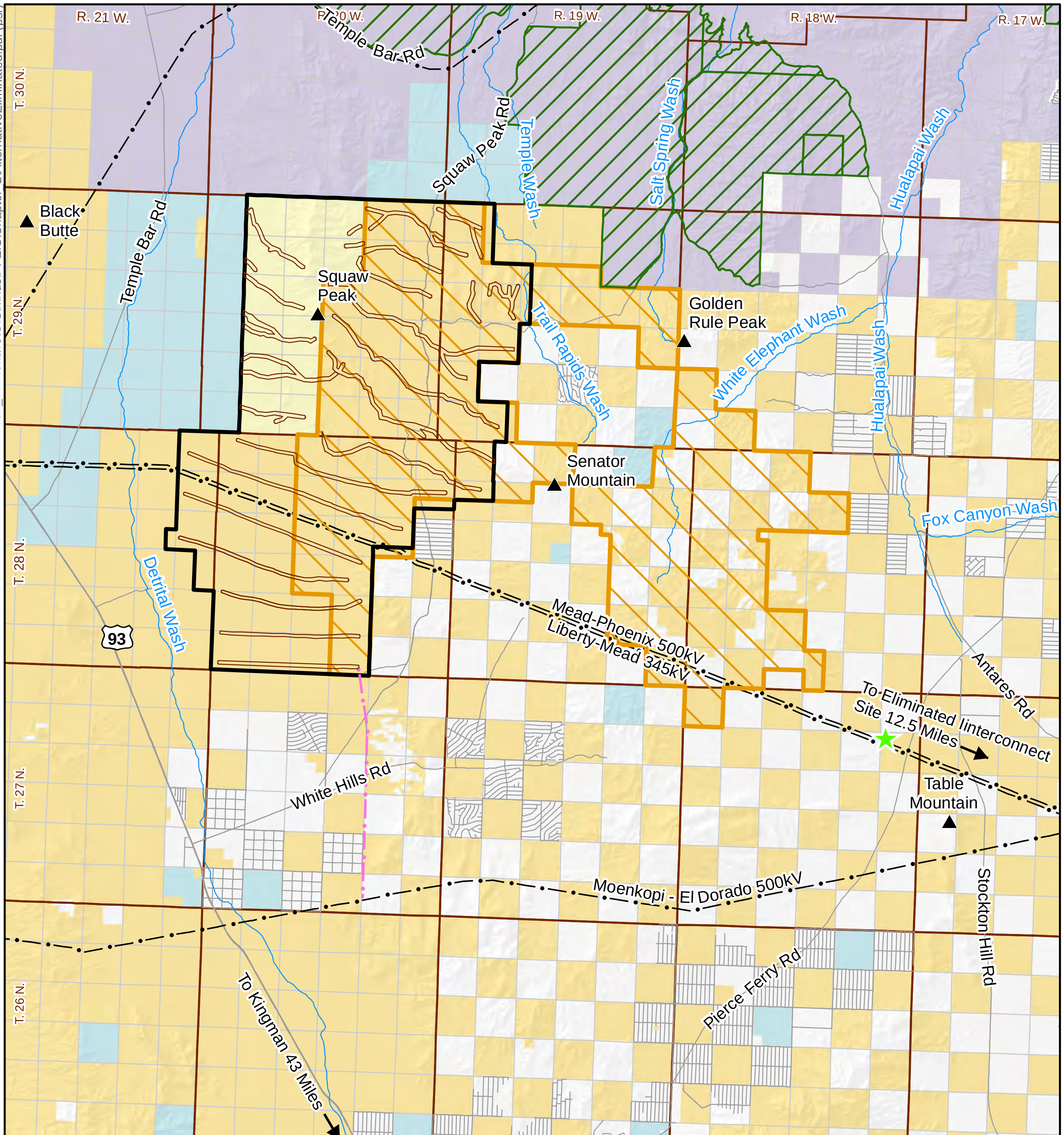
2.9.1 Use Land East of Current Wind Farm Site

In the initial stages of Project development, a Project location alternative involving approximately 44,860 acres of public land administered by the BLM and 4,360 acres of private land was considered for the construction of up to 333 wind turbines generating up to 500 MW of power. As shown on Map 2-14, this alternative would have included some of the land being addressed in the Wind Farm Site for Alternative A, but also included additional public and private land to the east. Public scoping meetings on this alternative were conducted in December 2009.

Comments received during scoping identified concerns for developing on and near private land in the Project Area (as defined by this alternative), including possible effects on property values, noise, and changes to the visual setting. Potential conflicts with existing mining claims were identified and preliminary environmental studies determined that the potential for adverse impacts on bats and birds were greatest in the eastern portion of the project footprint, which had been described as the "subsequent phases" area. There also were concerns for acquiring leases for the private land. Based on all of these considerations, the land previously identified for subsequent phases of development (including 13,522 acres of BLM-administered land and 4,360 acres of private land) was eliminated from detailed consideration. This alternative was eliminated from further analysis in this EIS.

2.9.2 Use 36,000 Acres of BLM-administered and Reclamation-administered Land

To achieve the desired capacity of generation following the elimination of the "subsequent phases" area described in Section 2.9.1, BP Wind Energy proposed to develop within an area consisting of 27,033 acres of public land managed by the BLM and 8,960 acres of land managed by Reclamation. To inform the public of the changed Project footprint and to solicit comments on the change, additional public scoping meetings were held in August 2010 in the communities of Kingman, Dolan Springs, White Hills, and Peach Springs. As shown on Map 2-15, the land area defining this alternative continues to be part of the Wind Farm Site for Alternative A, the proposed action; however, Alternative A was expanded in size in the southern portion of the Project after another applicant withdrew its application to develop a solar energy project on adjacent BLM-administered lands. Consequently, while the land area associated with this alternative is still under consideration, no alternative footprints for the proposed Wind Farm Site currently match the footprint that was presented to the public during the August 2010 public scoping meetings (Map 2-15).



No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

*The lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

Map 2-14
Use Land East of Current Wind Farm Site (Eliminated from Consideration)

Mohave County Wind Farm Project

Legend

- Alternative A Wind Farm Site
- Alternative Eliminated
- Turbine Corridor
- Transmission Line to tie to Moenkopi - El Dorado
- Eliminated Switchyard Interconnect Sites

Surface Management

- Bureau of Land Management
- National Park Service
- Bureau of Reclamation
- State Trust Land
- Private Land
- National Park Service Proposed Wilderness

- Township and Range Boundary
- Section Boundary
- Existing Transmission Line
- Road
- Wash
- Mountain Summit

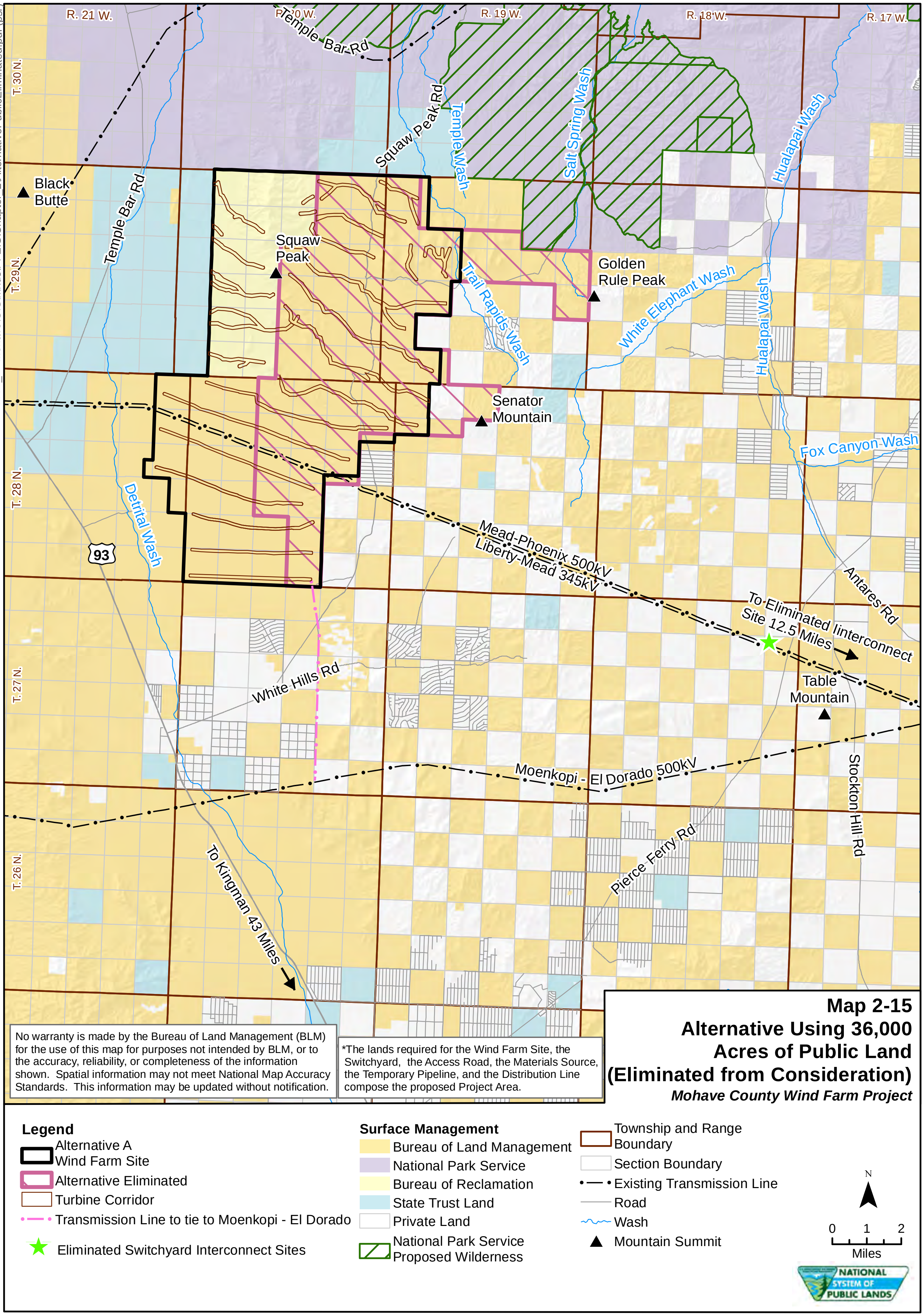
N

0 1 2

Miles

NATIONAL SYSTEM OF PUBLIC LANDS

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)



No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

*The lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

Map 2-15
Alternative Using 36,000 Acres of Public Land (Eliminated from Consideration)
Mohave County Wind Farm Project

Source:
Base Map: BLM 2009-2010, ALRIS 2007-2008, ESRI 2008, NHD 2008, Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

2.9.3 Alternative Locations that Failed to Satisfy Siting Criteria

Other alternative locations were suggested, without a specific location that can be mapped, but were eliminated as potential siting areas because they failed to meet the siting criteria described in Section 2.2. For example, one suggestion was to move the Project south of Western's transmission lines or west of US 93, but this area is at a lower elevation diminishing the wind resources, has sandier soils, and has constraints to a suitably sized area because of drainage concerns associated with Detrital Wash, the Black Mountains Area of Critical Environmental Concern, developed private property, and an existing application for a solar project. The application for the solar project has since been withdrawn with some of the land previously included in the application for the solar project now included in the four action alternatives being considered. The land constraints associated with these alternative locations would not provide an adequate land area with sufficient wind speeds for developing an economically competitive wind project. Alternative sites that did not provide sufficient wind resources, sufficient amount of land, suitable transmission and physical access, and/or would have significantly impacted environmental resources or conflicted with existing land uses were eliminated from further analysis.

2.9.4 Interconnection to Moenkopi-El Dorado 500-kV Transmission Line

The Moenkopi-El Dorado 500-kV transmission line runs in an east-west direction and is located approximately 6 miles south of the proposed Wind Farm Site. An alternative to run transmission line parallel to a section line from the Wind Farm Site south to the transmission line and then building the switchyard in Township 27 North, Range 20 West, Section 35 along the Moenkopi-El Dorado transmission line was considered. This alternative was eliminated from detailed analysis because the Moenkopi-El Dorado transmission line currently does not have the capacity to accommodate an additional 425 to 500 MW of generated power.

2.9.5 Switchyard Locations Outside of the Wind Farm Site

Two alternative switchyard locations were considered for an interconnection with the Mead-Phoenix 500-kV transmission line. Both locations were east of the Wind Farm Site with one in Township 27 North, Range 18 West, Section 12 and the other in Township 26 North, Range 21 West, Section 10.These two interconnection points were considered during the preparation of the electrical system studies when a solar-powered generation facility was proposed for a location east of the Mohave County Wind Farm Project to determine if a shared interconnection point would provide greater stability to the electric power grid. Plans for the solar project currently are not being pursued so alternatives involving a shared interconnection point were eliminated from detailed analysis.

2.9.6 Distributed Generation and Energy Conservation

The feasibility of using residential and wholesale distributed generation, in conjunction with increased energy efficiency, was considered as an alternative to building the Project. This alternative was considered but eliminated from further analysis in this EIS for several reasons. First, the proposed Project location is remote and sparsely developed; therefore, this area does not have enough residential or commercial developments to generate the amount of power that could be produced by the proposed wind farm. Second, increasing energy efficiency would be beyond the ability of either BLM or BP Wind Energy to either enforce or monitor. Even with full energy efficiency compliance, the area would not conserve power at the same scale in which the proposed Project would produce power. Finally, this alternative would not satisfy BLM's purpose and need for the Project to allow for the development of utility-scale wind energy resources to meet forecasted increased energy demands nor does it respond to BLM's purpose and need to consider an application for the authorized use of public land for a specific renewable energy technology.

2.9.7 Brownfields and Previously Disturbed Areas

Siting the Project in designated Brownfield areas, or other previously disturbed or marginal quality areas was considered as described in the site selection process in Section 2.2 of this EIS. However, the areas where large tracts of land and wind resources are sufficient to generate utility-scale wind farms capable of generating up to 500 MW of power in Arizona do not coincide with the Brownfields and previously disturbed or marginal lands identified as satisfying the criteria for the Restoration Design Energy Project (BLM 2010). While State land adjacent to the Project Area was nominated for consideration in the Restoration Design Energy Project, the land does not appear to be disturbed. In addition, no Brownfield sites have been identified within Mohave County or within BLM's Kingman Field Office jurisdiction. Therefore, an alternative to locate the Project in a Brownfield or on previously disturbed or marginal quality land in Mohave County would not be technically or economically feasible and this alternative was eliminated from detailed study in this EIS.

2.9.8 Reduced Footprint with Reduction in Capacity

The agencies considered analyzing an alternative that would reduce the Project's footprint based on a generating capacity of 300 MW within the boundaries described in Alternatives B and C. This alternative, like the action alternatives, would respond to issues identified during agency scoping, primarily in connection with potential visual and noise impacts to recreation users, existing and planned residential areas, and the overall level of surface disturbance resulting from the Project. As explained below, the BLM eliminated this reduced footprint/300 MW minimum generation alternative from detailed analysis because the technical design of such an alternative would be substantially similar in both its design and effects to the reduced footprint Alternatives B and C. Alternatives B and C analyze an output range from 310 MW to 500 MW, and thus the 300 MW minimum generation output design is within the scope of these alternatives.

A reduced footprint alternative that focuses on meeting a 300 MW minimum for generation capacity would produce a project with a similar footprint size to Alternatives B and C. The size of the footprint is dictated by the type of turbines selected (i.e., manufacturers' specifications of the different types of turbines vary), which the applicant has not yet selected. The project design analyzed in the EIS focuses on turbine corridors for the action alternatives, which are mapped to provide sufficient flexibility to allow development of a commercially viable project, taking into account the long permitting timeline, rapidly changing turbines available in the market and turbine design and the site-specific constraints. Due to the range and complexity of factors discussed in Section 2.5 that must be considered before siting turbines within the corridors (e.g., environmental conditions, engineering, construction and safety), any reduction of the number and extent of the turbine corridors analyzed in Alternatives B, C and E would likely lead to a project that is both technically and economically infeasible.

The diameter of the rotor is the technical factor that most influences turbine layout and spacing requirements so that wake turbulence from one turbine does not diminish the power of the wind and the power generated by downwind turbines. Other considerations in turbine spacing and layout include a combination of the overall physical size of the turbine, the site constraints (physical setbacks, noise, land agreements, etc.), topographic complexity, the wind resource (wind speed, turbulence, wake effects, etc.), and the balancing of the generation efficiency of spaced-out turbines (while meeting manufacturer minimum spacing criteria so as not to cause damage to downwind turbines due to turbulence) and the need to keep turbines within a more compact area due to cost and available land considerations. The spacing is an optimization based on energy production, cost of construction, and not exceeding the engineering design thresholds of the turbine, which happens when turbines are not spaced far enough apart. All of these factors vary greatly from site to site, but also vary within an individual project site causing spacing to potentially differ in different areas of a large wind farm (more than 100 MW). Spacing in predominant wind directions (between turbine corridors) can range from 5 to 12 rotor diameters and in non-predominant wind directions (within a turbine corridor) can range from 2.5 to 5 rotor diameters. It is uncommon to see modern wind farms with spacing less than 2.5 rotor diameters.

For this Project, preliminary turbine spacing was generally 8 to 10 rotor diameters between the rows of turbines and 3.5 to 5 rotor diameters within the corridors based upon wind turbine manufacturer's stability requirements. If 1.6 MW turbines are selected, 194 turbines would be needed to generate approximately 310 MW. If 2.3 MW turbines are selected, 134 turbines would be needed to generate the same amount of capacity (310 MW). However, rotor diameter and the resulting space required between turbines results in the same land area being necessary for 194 1.6 MW turbines and for 134 2.3 MW turbines.

As indicated in Table 2.6, the rotor diameter with 1.6 MW turbines would be between 295 feet and 331 feet, requiring turbines within the corridor to be about 1,000 feet to 1,650 feet apart. The 194 turbines would therefore occupy the same area as described in Alternative B or C (see Maps 2-6 and 2-9). With 2.3 MW turbines, the rotor diameter would be between 367 feet and 387 feet and the spacing between turbines within the corridors would be about 1,300 feet to 1,900 feet. The 134 turbines would also require the same land area as described in Alternative B or C (see Maps 2-7 and 2-10).

Under Alternatives B and C, a 1.6 MW turbine could be selected to reduce the capacity of the Project to approximately 310 MW. However, the number of turbines required to produce 310 MW (194 turbines) would be greater than the number of turbines necessary to produce 352 MW of power (153 turbines) if 2.3 MW turbines were used in the same turbine corridors. In other words, a reduced footprint alternative that focuses on a 300 MW generation minimum would provide for substantially similar designs as contemplated in Alternatives B and C, and therefore any such alternatives would likely have similar environmental effects to Alternatives B and C.

Additionally, an alternative reducing the footprint of the Project by focusing on a reduction in generating capacity to 300 MW would require the developer to reapply for interconnection with Western because all other opportunities to change the existing application have expired. In making application for electrical interconnection of the Project, BP Wind Energy initially indicated a Project nameplate power output of 500 MW. In order to provide for fairness and transparency in its interconnection procedures, and to avoid exposing other proposed developers in the region to a constantly changing technical environment and cost uncertainty with respect to the facilities that may need upgrades, only a limited number of modifications to the information provided in a project's interconnection request may be made. The modifications may include but not be limited to those related to electrical output (MW), technological parameters, and interconnection configuration. During the course of the interconnection study, if a developer is not able to avoid substantial changes to these and other project characteristics, it will be required to re-apply for interconnection.

There are two opportunities to adjust the amount of power a developer intends to connect to the system; however, if project conditions change late in the large generator interconnection agreement (LGIA) process, the developer may miss those two opportunities, and thus lose its place in the interconnection queue. By re-applying, the developer would likely be confronted with an entirely different set of system conditions that would affect the amount of available transmission capacity and extent and cost of necessary system upgrades because its application would be evaluated after those applications of others requesting interconnection for transmission or new generation purposes (rather than before). Consequences could include additional system impact studies and facilities studies, changes to the facilities needed, additional time to conduct studies, additional costs associated with such studies and facility upgrades (should any be identified), and the possibility that capacity may not be available on the transmission line to accommodate electricity generated by the project thereby making it impossible to interconnect and develop the project.

As system studies were advancing, BP Wind Energy exercised its option to make an allowable change under the rules, and reduced its proposed nameplate capacity by the allowable 15 percent to 425 MW for its interconnection to the Liberty-Mead 345-kV line. BP Wind Energy did not reduce the proposed nameplate capacity associated with the interconnection to the 500kV line, as the timeframe for such reductions, without requiring them to re-apply, had already passed.

Should BP Wind Energy not have the ability to generate this capacity of power from the proposed Project, but still want to proceed with wind generation at this site, per Western's LGIP, BP Wind Energy would need to re-apply for interconnection with the potential consequences as described above. Western has indicated that such procedures exist because proponents of other proposed projects who have applied to make interconnections on its system later in time than the Mohave County Wind Farm Project could be impacted by changes to the Mohave County Wind Farm Project (or any proposed projects that filed earlier). That is, any reduction in the size of the Project's requested interconnection capacity changes the nature of the electrical system (power flows and amount of available capacity) for applicants behind the Project in the interconnection queue. If system impact studies are underway for those other proposed projects, they would need to be re-evaluated if BP Wind Energy were to change its interconnection application, which would increase costs (to be borne by BP Wind Energy) and take additional time to complete.

With other applicants following BP Wind Energy in the queue, the transmission lines might not have remaining capacity by the time a revised application could be considered, resulting in a major risk to the viability of the Project. A lack of transmission capacity would prevent the Project from connecting to the power grid without transmission system upgrades that cost dramatically more than those anticipated by BP Wind Energy when it initially decided to undertake development of the Project.

2.9.9 Underground Transmission Lines

While it would reduce visual impacts and reduce the potential for impacts to avian species and other wildlife, the alternative to bury the high-voltage transmission lines was eliminated from further consideration because of the difficulty in cooling the heat-generating high-voltage lines when they are buried, the complex maintenance issues, increased amount of ground disturbance, and the associated costs.

An overhead transmission line would carry power from the on-site substations to the switchyard where the power would be transferred to the electrical power grid. The transmission line would be the same voltage as the power line to which it interconnects (that is, either 345 kV or 500 kV). The length of the new transmission line would be approximately 6 miles. Adherence to modern design criteria would follow Avian Power Line Interaction Committee (APLIC) guidelines, which would minimize the likelihood of electrocution of raptors.

2.10 SUMMARY OF EFFECTS FROM ALTERNATIVES

A summary of potential resource impacts for each of the four alternatives presented in this EIS is presented in the Executive Summary.

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

In accordance with National Environmental Policy Act (NEPA) regulations codified at Title 40 Code of Federal Regulations (CFR) 1502.15, this chapter presents a summary of the existing conditions of the human and natural environments in the areas that potentially could be affected. This information serves as the baseline to assess the impacts that are anticipated to result from implementing the proposed Mohave County Wind Farm Project (Project) or alternatives. The environment that would be affected by the Project or alternatives is characterized for the following resources, land uses, and social and economic conditions.

- Climate and Air Quality
- Geology, Soils, and Minerals
- Water Resources
- Biological Resources
- Cultural Resources
- Paleontological Resources
- Land Use
- Transportation and Access
- Social and Economic Conditions
- Environmental Justice
- Visual Resources
- Public Safety, Hazardous Materials, and Solid Waste
- Microwave, Radar, and Other Communications
- Noise

These topics were selected based on Federal regulatory requirements and policies, concerns of the lead and cooperating agencies, and/or issues expressed by agencies, and the public during scoping.

The existing conditions of the environment are described based on recent available data—primarily literature, published and unpublished reports, and agency databases. Field reconnaissance verified data gathered for visual resources, vegetation, and wildlife. Three long-term sound level measurements were conducted. Intensive field surveys were conducted to inventory cultural resources within the proposed areas of disturbance, including turbine corridors, interior roads, facility sites, and along linear features such as the proposed access route and potential transmission line routes. The Project Area addressed in the following sections is defined in Chapter 2 and includes the Wind Farm Site, an existing access road with a proposed extension past the Detrital Wash Materials Pit to the Wind Farm Site, and a distribution line and temporary water pipeline that would be within the primary access road right-of-way (ROW).

The areas where different Project components are or would be located were examined at different resource-dependent scales for each resource. For example, air quality or socioeconomic conditions are analyzed over broad areas, while other analyses focus on more localized resource areas, such as a view or an archaeological site. In areas of broader focus, specific Project components are not necessarily addressed, or are addressed as a group.

3.2 CLIMATE AND AIR QUALITY

3.2.1 Introduction

Climate data were obtained from the Western Regional Climate Center (WRCC). Data on air quality regulations and area attainment status applicable in the State of Arizona were obtained from Federal and State air quality permitting authorities, specifically the U.S. Environmental Protection Agency (USEPA) and the Arizona Department of Environmental Quality (ADEQ) websites. The Arizona Administrative Code was used as a source for air pollution control regulations enforced by the ADEQ. The Mohave County website was reviewed for local air quality requirements. National Park Service (NPS), USEPA, and ADEQ resources were reviewed to identify air quality monitors near the Project Area.

3.2.2 Regional Overview

Climate

The Project region is characterized by shallow to steeply sloping ridges within the White Hills formation. Surrounding areas include the Detrital Valley to the west, the Hualapai Valley to the east, Lake Mead National Recreation Area to the north, and the White Hills community to the south. Table 3-1 summarizes meteorological conditions within and near the Project region.

Table 3-1 Meteorological Conditions Within and Near the Project Region

Monitor	Winter Average	Spring Average	Summer Average	Fall Average	Annual Average
Mean Monthly Temperature Average degrees Fahrenheit (°F)[a]					
Boulder City, Nevada	48.4	65.5	86.6	68.5	67.2
Temple Bar	49.1	69.4	92.5	70.9	70.5
Yucca, Arizona	50.0	64.8	86.7	68.8	67.6
Searchlight, Nevada	46.1	61.1	81.9	65.1	63.5
Kingman, Arizona	44.9	58.7	79.4	63.2	61.6
Kingman No. 2, Arizona	44.4	58.4	80.1	63.1	61.5
Mean Monthly Precipitation Average (inches)[a]					
Boulder City, Nevada	1.81	1.18	1.30	1.26	5.55
Temple Bar	2.30	0.97	1.25	1.09	5.62
Yucca, Arizona	2.62	1.47	1.71	1.73	7.47
Searchlight, Nevada	2.63	1.39	2.13	1.56	7.70
Kingman, Arizona	3.56	1.96	2.47	2.36	10.35
Kingman No. 2, Arizona	3.28	2.20	2.77	2.22	10.47
Average Wind Speed (miles per hour)[b]					
Kingman AP, Arizona	8.2	10.9	11.2	8.5	9.7

SOURCE: Western Regional Climate Center 2009

NOTES: AP = Airport
AZ = Arizona
NV = Nevada
Fall Average = Average for the months of September, October, and November
Spring Average = Average for the months of March, April, and May
Summer Average = Average for the months of June, July, and August
Winter Average = Average for the months of December, January, and February

°F = degrees Fahrenheit

[a] For mean monthly temperature and mean monthly precipitation, the period used for Boulder City, Nevada, is 1931 to 2004; for Temple Bar, Arizona, 1988 to 2007; for Yucca, Arizona, 1950 to 2009; for Searchlight, Nevada, 1913 to 2009; for Kingman, Arizona 1901 to 2003; and for Kingman No. 2, Arizona 1967 to 1993.

[b] For average wind speed values, averages are based on data collected between 1996-2006.

Due to its moderately high elevation (on average approximately 4,250 feet above mean sea level [MSL]), Mohave County experiences milder summers and colder winter temperatures than the low desert regions of Arizona. Average annual temperatures near the Project Area are in the low 60s degrees Fahrenheit (°F). Summer temperatures generally range from the mid-70s to the mid-90s °F. In winter, early morning temperatures normally drop to the low 30s and reach the mid-50s °F by the afternoon (WRCC 2009).

Mohave County in northwestern Arizona has an arid desert climate, characterized by moderate variations in diurnal and annual temperature. The area receives precipitation during the summer months, when afternoon showers form as a result of moist air from the Gulf of Mexico moving over the area, and in the fall and winter, when cold fronts moving to the east and southeast from the Pacific Ocean create steady, usually light rain. The average amount of precipitation received annually in the Project vicinity is 8 to 10 inches, including a small amount of snowfall. While snowfall is not unusual during the winter months, snow rarely accumulates to significant depths. Evaporation is correspondingly high, due to high temperatures, the dryness of the air, and the high percentage of sunshine. Mean lake evaporation varies from approximately 80 inches per year in the southwestern part of the state to 50 inches in the northeast (WRCC 2009).

Extreme weather is very uncommon in the region. Other than an occasional strong thunderstorm that produces heavy rain, high winds, and possibly damaging hail, more severe events, such as tornados, are very rare.

Wind patterns in the Project vicinity are primarily influenced by seasonal and diurnal patterns and by local topography, resulting in variability of both wind speed and direction. As a result, wind speeds are typically higher during the afternoon than in morning or evening hours. Thirteen temporary meteorological stations (12 meteorological towers (met towers) and one sonic detection and ranging system [SODAR]) have been constructed to collect data within the Project Area boundary. These stations are being used to collect data on the wind resources available. Two to three permanent meteorological stations are planned and additional temporary met towers may be installed within the proposed ROW for testing during construction.

Air Quality

Air quality is characterized by the concentration of specified pollutants in the atmosphere in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The significance of the concentration of each pollutant is determined through comparison with applicable air quality standards. For the proposed Project, predicted emissions are compared to National Ambient Air Quality Standards (NAAQS), as identified in the Federal Clean Air Act (CAA) and regulated by the USEPA (see Table 3-2).

The process for establishing NAAQS is exhaustive and thorough. Federal regulations require the NAAQS be evaluated periodically to ensure they remain health protective. Each of these evaluations represents an extensive process consisting of examining the available health data and assessing whether the existing air concentration standard is adequately health-protective. In addition, an independent committee of non-USEPA experts conducts peer review of the USEPA work and provides the USEPA Administrator with advice and recommendations regarding the scientific adequacy of the USEPA evaluation.

National Ambient Air Quality Standards

Since 1970, the Federal CAA and subsequent amendments have provided the authority and framework for USEPA regulation of air emission sources. The USEPA regulations promulgated pursuant to the authority provided in the CAA serve to establish requirements for the monitoring, control, and documentation of activities that will affect ambient concentrations of certain pollutants that may endanger public health or welfare. In particular, these regulations have the overall objective of achieving and maintaining adherence to appropriate standards for ambient air quality.

As an enforcement tool, the CAA establishes the NAAQS, which currently apply to the following criteria pollutants:

- sulfur dioxide (SO_2)
- carbon monoxide (CO)
- nitrogen dioxide (NO_2)
- particulate matter equal to or less than 10 microns in diameter (PM_{10})
- particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$)
- ozone (O_3)
- lead (Pb)

The CAA established two types of NAAQS: primary standards to protect public health, including the health of sensitive populations such as individuals with respiratory conditions, children, and the elderly; and secondary standards to set limits that protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. These standards are defined in terms of threshold concentration (e.g., ppm and $\mu g/m^3$) measured as an average for specified periods of time (averaging times). Short-term standards (i.e., 1-hour, 8-hour, or 24-hour averaging times) were established for pollutants with acute health effects, while long-term standards (i.e., annual averaging times) were established for pollutants with chronic health effects. The ADEQ Air Quality Division enforces compliance with the NAAQS for criteria air pollutants emitted by sources within the agency's jurisdiction, which includes Mohave County. The NAAQS are listed in Table 3-2 (USEPA 2010c).

Table 3-2 National Ambient Air Quality Standards

Pollutant	Primary Standard		Secondary Standard	
	Level	**Averaging Time**	**Level**	**Averaging Time**
Sulfur dioxide (SO_2)	75 ppm	1-hour	0.5 ppm	3-hour[1]
	0.14 ppm	24-hour[1]		
	0.03 ppm	Annual		
Particulate matter equal to or less than 10 microns in diameter (PM_{10})	150 μg/m³	24-hour[2]	Same As Primary	
Particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$)	35 μg/m³	24-hour[3]	Same As Primary	
	15 μg/m³	Annual[4]	Same As Primary	
Carbon monoxide (CO)	35 ppm	1-hour[1]	—	
	9 ppm	8-hour[1]	—	
Nitrogen dioxide (NO_2)	0.053 ppm	Annual	Same As Primary	
	0.100 ppm	1-hour[5]	Same As Primary	
Lead (Pb)	1.5 μg/m³	Quarterly[6]	1.5 μg/m³	
Ozone (O_3)	0.12 ppm	1-hour[7]	Same As Primary	
	0.08 ppm (1997 std)	8-hour[8]	Same As Primary	
	0.075 ppm (2008 std)	8-hour[9]	Same As Primary	

SOURCE: U.S. Environmental Protection Agency 2010

NOTES: μg/m³ = micrograms per cubic meter

ppm = parts per million

To convert from ppm to μg/m³, multiply the value in μg/m³ by 0.02445 and divide by the molecular weight of the pollutant.

(1) Not to be exceeded more than once per year.

(2) Not to be exceeded more than once per year on average over 3 years.

(3) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 μg/m³.

(4) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m³ (effective December 17, 2006).

(5) To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).

(6) Final rule signed October 15, 2008.

(7) (a) USEPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1.

(8) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 O_3 standard to the 2008 O_3 standard.
(c) USEPA is in the process of reconsidering these standards (set in March 2008).

(9) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).

The USEPA assigns classifications to geographic areas based upon monitored air quality conditions. An area is classified for each of the criteria pollutants as one of three categories:

- **Attainment** – an area that meets the national primary and secondary ambient air quality standard for the pollutant,
- **Nonattainment** – an area that does not meet (or contributes to ambient air quality in an area that does not meet) the national and secondary standard for the pollutant, or
- **Unclassified** – an area that cannot be classified on the basis of available information as meeting or not meeting the national primary and secondary ambient air quality standard for the pollutant; with respect to air quality permitting requirements, unclassified areas are treated as attainment areas.

Sufficient monitoring data must be available for the USEPA to designate an area as attainment. Areas in which air pollutant concentrations exceed the NAAQS are designated as nonattainment for specific pollutants and averaging times. Typically, nonattainment areas are urban regions and/or areas with higher-density industrial development. Since an area's attainment status is designated separately for each criteria pollutant, one geographic area may have all three classifications.

One area near Bullhead City in Mohave County, approximately 40 miles south of the Project Area, is categorized as "PM_{10} Attainment with a Maintenance Plan." This means that the area was previously classified as non-attainment, a State Implementation Plan was established to outline a plan for achieving compliance with the PM_{10} NAAQS, the plan was executed successfully, ADEQ demonstrated to USEPA that the area had achieved compliance, and USEPA redesignated the area as an attainment area. All other areas within Mohave County are currently classified as attainment or are unclassified. See Figure 3-1 (ADEQ 2008).

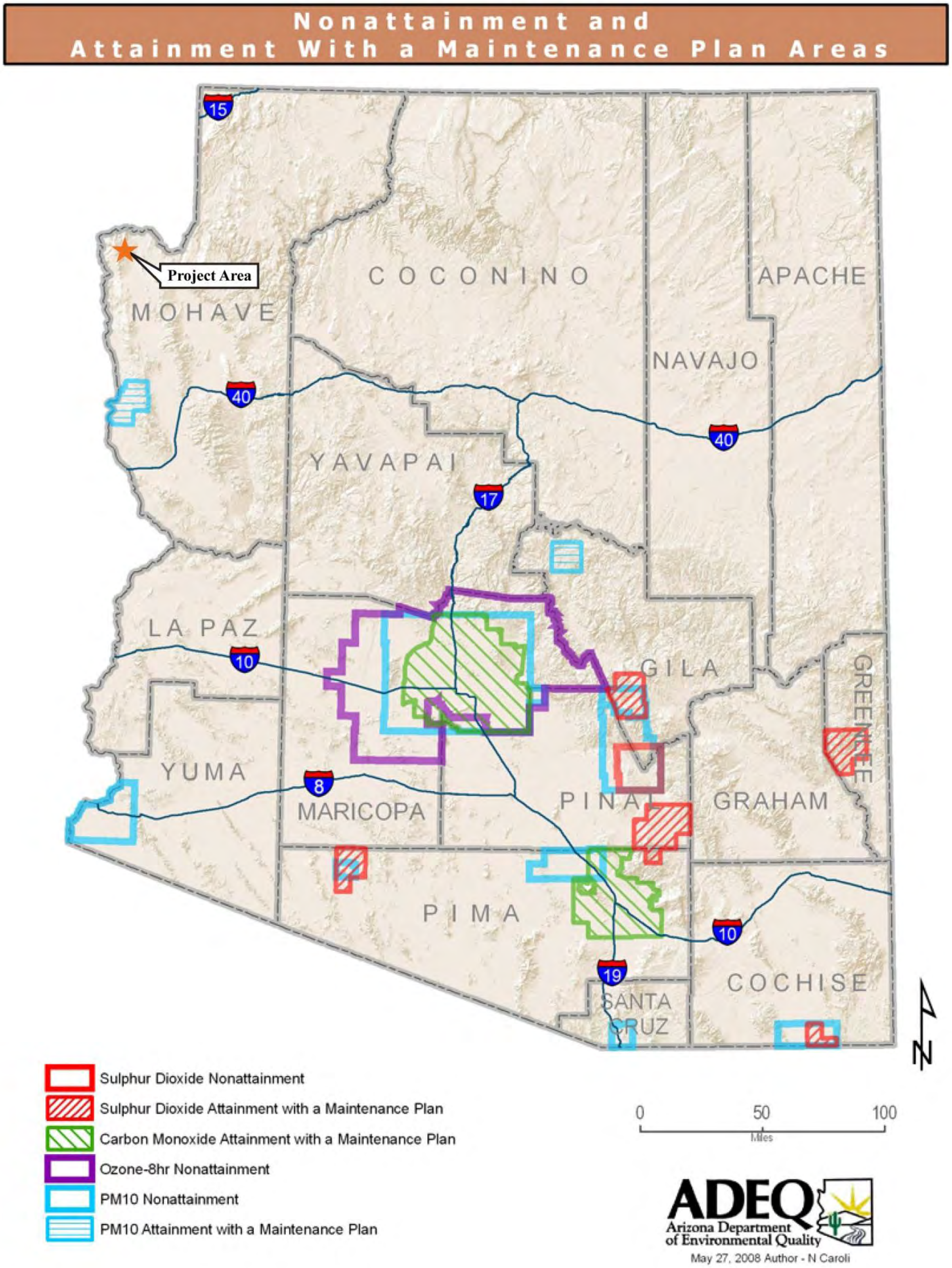


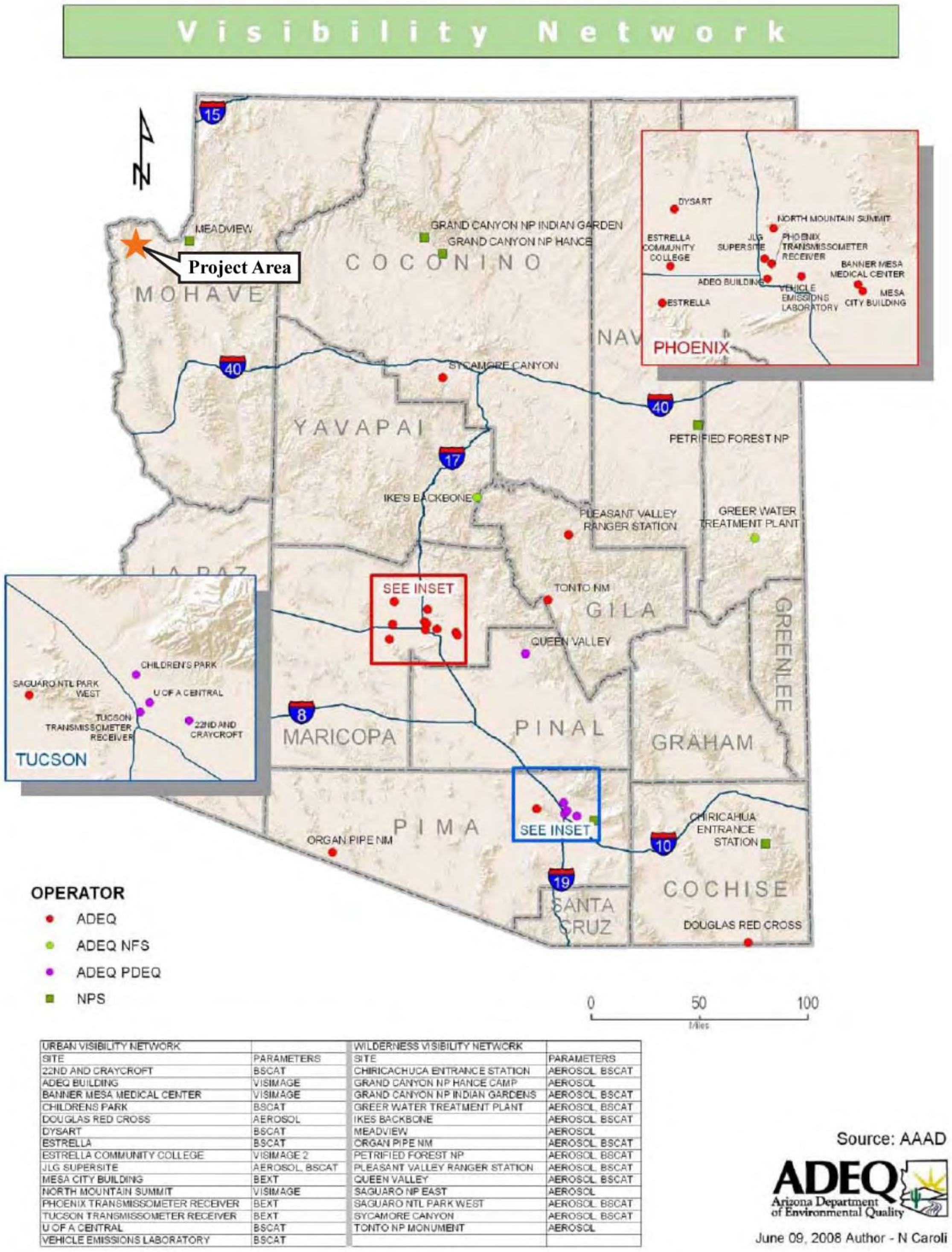
Figure 3-1 Nonattainment and Attainment with Maintenance Plan Areas

Prevention of Significant Deterioration

The Federal Prevention of Significant Deterioration (PSD) program is part of a larger pre-construction review and permitting process called New Source Review (NSR). The overall purpose of the PSD Permitting Program, which applies to major sources in areas currently meeting the NAAQS, is to: (1) protect public health and welfare from the effects of air pollution or exposure to pollutants that originated in the air and preserve attainment and maintenance of the NAAQS, (2) preserve, protect, and enhance air quality and visibility in national parks, national wilderness areas and other areas of special natural, recreational, scenic, or historic value, (3) provide for economic growth while preserving clean air resources, (4) prevent emissions from any source from interfering with objectives in any implementation plan aimed at preventing significant deterioration of air quality, and (5) to assure that decisions to allow increased air pollution are made only after evaluating the related consequences and providing opportunities for public participation in the process (USEPA 2008). The Federal NSR/PSD regulations are codified at 40 CFR §51.166 and §52.21. These requirements are incorporated into Arizona air quality permitting regulations, under Arizona Administrative Code (A.A.C.), Title 18, Chapter 2, Article 4.

Areas meeting criteria for relatively pristine air quality (and unique natural features on a national level) receive the highest level of air quality protection. International parks, national parks larger than 6,000 acres, national memorial parks larger than 5,000 acres, and national wilderness areas larger than 5,000 acres are designated as Class I areas. Class III is assigned to attainment areas where maximum industrial growth is allowed as long as the NAAQS are not exceeded (to date, no Class III areas have been designated). All other areas in the U.S. are designated Class II.

Grand Canyon National Park (GCNP) is a Class I area and is located approximately 18 miles northeast of the Project Area. Lake Mead National Recreational Area (NRA), located directly north of and adjacent to the proposed Wind Farm Site, is designated Class II. Air quality monitors located in GCNP and Lake Mead NRA (labeled as Meadview) are identified on Figure 3-2.



URBAN VISIBILITY NETWORK		WILDERNESS VISIBILITY NETWORK	
SITE	PARAMETERS	SITE	PARAMETERS
22ND AND CRAYCROFT	BSCAT	CHIRICACHUCA ENTRANCE STATION	AEROSOL BSCAT
ADEQ BUILDING	VISIMAGE	GRAND CANYON NP HANCE CAMP	AEROSOL
BANNER MESA MEDICAL CENTER	VISIMAGE	GRAND CANYON NP INDIAN GARDENS	AEROSOL, BSCAT
CHILDRENS PARK	BSCAT	GREER WATER TREATMENT PLANT	AEROSOL, BSCAT
DOUGLAS RED CROSS	AEROSOL	IKES BACKBONE	AEROSOL BSCAT
DYSART	BSCAT	MEADVIEW	AEROSOL
ESTRELLA	BSCAT	ORGAN PIPE NM	AEROSOL BSCAT
ESTRELLA COMMUNITY COLLEGE	VISIMAGE 2	PETRIFIED FOREST NP	AEROSOL BSCAT
JLG SUPERSITE	AEROSOL, BSCAT	PLEASANT VALLEY RANGER STATION	AEROSOL, BSCAT
MESA CITY BUILDING	BEXT	QUEEN VALLEY	AEROSOL BSCAT
NORTH MOUNTAIN SUMMIT	VISIMAGE	SAGUARO NP EAST	AEROSOL
PHOENIX TRANSMISSOMETER RECEIVER	BEXT	SAGUARO NTL PARK WEST	AEROSOL BSCAT
TUCSON TRANSMISSOMETER RECEIVER	BEXT	SYCAMORE CANYON	AEROSOL BSCAT
U OF A CENTRAL	BSCAT	TONTO NP MONUMENT	AEROSOL
VEHICLE EMISSIONS LABORATORY	BSCAT		

Figure 3-2 Visibility Network

USEPA Greenhouse Gas Mandatory Reporting Rule

The USEPA issued a mandatory reporting rule for large sources and suppliers of greenhouse gases (GHGs) in 2009. Subpart D of the rule addresses requirements for electric generating facilities. The rule limits applicability to sources in this category that are subject to 40 CFR Part 75, "Continuous Emission Monitoring." The operating wind farm would not include equipment subject to this rule. Certain electric generating units are covered under Subpart C, "General Stationary Fuel Combustion." However, the reporting threshold for this category is a combined 25,000 metric tons of carbon dioxide equivalent (CO_2e) emissions or more per year which equates to an estimated 30 million British thermal units (Btu) per hour of heat input capacity. The Project would not include combustion equipment that would trigger the reporting threshold. Emergency equipment and emergency generators are excluded from a facility's aggregate heat input rating under Subpart C.

The proposed Project would require construction of two substations and 6 miles of new transmission lines that would interconnect with an existing transmission line passing through the Project Area. Equipment used in the transmission of electricity, primarily certain substation equipment such as breakers, utilizes sulfur hexafluoride (SF_6), a greenhouse gas, as an insulator. SF_6 has a global warming potential (GWP) of 23,900, whereas carbon dioxide (CO_2) has a GWP of 1 (see Section 3.2.4). This means that 1 pound of SF_6 emitted in the atmosphere will trap 23,900 times more heat than 1 pound of CO_2 emitted into the atmosphere. The SF_6 is emitted through equipment leakage that results from deterioration of fittings and materials with time and can be minimized by implementing a thorough inspection and maintenance program. Emissions from Electric Power Systems are reportable under the GHG Reporting Rule if the total nameplate capacity of SF6-containing equipment exceeds 17,820 pounds of SF_6, which is estimated to be the equivalent to an emissions threshold of 25,000 metric tons of CO_2e per year. While equipment within the substations may include SF_6, the amount of SF_6 to be used for the proposed action would be much lower than this threshold, and no SF_6 would be associated with the new transmission lines.

Arizona Air Quality Regulations

The State of Arizona has promulgated air pollution control regulations, which are codified in Title 18, Chapter 2 of the A.A.C. These regulations include general administrative procedures and more specific requirements pertaining to various types of operations. The proposed Project would potentially be subject to the requirements contained in the following articles, which are located in Title 18, Chapter 2 of the A.A.C.:

- Article 1: General
- Article 2: Ambient Air Quality Standards; Area Designations; Classifications
- Article 3: Permits and Permit Revisions
- Article 4: Permit Requirements for New Major Sources and Major Modifications to Existing Major Sources
- Article 5: General Permits
- Article 6: Emissions from Existing and New Nonpoint Sources
- Article 7: Existing Stationary Source Performance Standards
- Article 8: Emissions from Mobile Sources (New and Existing)
- Article 9: New Source Performance Standards
- Article 17: Arizona State Hazardous Air Pollutants Program

The text that follows highlights selected requirements within these articles that are applicable to the proposed Project.

Article 1: General

The applicable air quality control region is defined in A.A.C. R18-2-101(10.d) as the Mohave-Yuma Intrastate Air Quality Control Region, which encompasses the counties of La Paz, Mohave, and Yuma.

Fugitive emissions are defined under of A.A.C. R18-2-101(49) as "those emissions which could not reasonably pass through a stack, chimney, or vent, or other functionally equivalent opening."

The definitions of "insignificant activity" given in Subsections (c) and (h) in A.A.C. R18-2-101(57) are applicable to the proposed facility. A.A.C. R18-2-101(57) provides a list of categories accepted as insignificant when the activity in an emissions unit is not otherwise subject to any applicable requirement.

The definition of an operating source emitting a significant quantity of regulated air pollutants is defined in A.A.C. R18-2-101(106). If the proposed project had the potential to emit any of the listed pollutants in excess of the corresponding yearly rates, it would meet the definition of significant. Operating emissions from a wind farm are not anticipated to exceed these levels. Fugitive dust emissions generated during construction are not subject to the significance criteria.

Article 2: Ambient Air Quality Standards; Area Designations; Classifications

This section defines ambient air quality standards for criteria pollutants including PM_{10}, $PM_{2.5}$, SO_2, O_3, CO, NO_2, and Pb. The NAAQS were discussed in the above section on applicable Federal regulations. The State of Arizona is currently updating Article 2 so that the ambient air quality standards in the rule will reflect the most recent updates to the NAAQS.

Criteria for areas of the State of Arizona designated as Class I, Class II, or Class III are discussed in A.A.C. R18-2-217. The subject property is considered a Class II area in the State of Arizona, since all areas not determined to be Class I are Class II, unless they have been redesignated by the Governor or Governor's designee in accordance with A.A.C. R18-2-217 E & F.

Article 3: Permits and Revisions

The ADEQ issues three classes of air quality permits: Class I, Class II, and general permits. (General permits are discussed under Article 5.) Class I permits are issued for major sources of air pollutants. A major source is one that has the potential to emit 100 tons per year of any criteria pollutant, 10 tons per year of any single hazardous air pollutant (HAP), or 25 tons per year of any combination of HAPs. Class I permits also are issued to affected sources defined in A.A.C. R18-2-101(5) and solid waste incineration units. Class II permits are issued to sources that do not require Class I permits and meet the requirements in A.A.C. R18-2-302(B)(2). This includes "minor" sources that emit significant quantities of regulated air pollutants (see "Article 1: General," above), sources that operate internal combustion engines rated at 325 horsepower or greater, sources operating fuel-burning equipment rated at more than 1 million Btu per hour operated continuously for 8 hours, and sources subject to CAA Sections 111 or 112.

Article 4: Permit Requirements for New Major Sources and Major Modifications to Existing Major Sources

These are the NSR/PSD requirements mentioned in the previous section. In general, permit applications for major sources in NAAQS attainment areas must demonstrate that Best Available Control Technology (BACT) will be installed to control the pollutants emitted at major source levels, and to show, through a refined dispersion analysis, what the impacts of criteria pollutant emissions would be on ambient air quality, visibility and other Air Quality Related Values (AQRVs). Permit applications for major sources in NAAQS nonattainment areas must demonstrate Lowest Achievable Emission Rate (LAER), instead of BACT, and show that nonattainment pollutant emissions have been offset by emission reductions elsewhere within the nonattainment area (by amounts greater than 1:1, depending on the severity of the nonattainment area). The proposed Project would be subject to these requirements if it includes fossil-fuel equipment that emit 100 tons of a criteria pollutant per year.

Article 5: General Permits

General permits are preapproved permits covering specific classes of sources, which include concrete batch plants (limited to daily production of 1,175 cubic yards (yd^3) when operating under commercial power), crushing and screening plants (limits apply for PM_{10}, CO, and nitrogen oxide [NOx] emissions), and generators (with total capacity less than 325 horsepower). Sources may apply for coverage under a general permit by completing and submitting the appropriate application, in accordance with the established guidelines. The contractor operating equipment subject to permitting requirements would apply for coverage for concrete batch and crushing/screening plants, generators, and other equipment, as appropriate.

Article 6: Emissions from Existing and New Nonpoint Sources

Open burning is prohibited unless a permit is obtained from the appropriate authority. Permits in this area of Mohave County may be obtained from ADEQ. Permits are required for construction burning, agricultural burning, residential burning, prescribed burns conducted on private lands, fires set by a public officer performing an official duty, and open outdoor fires of dangerous materials or household hazardous waste or of a nature that requires an air curtain destructor. These types of fires and those that do not require a permit are defined in A.A.C. R18-2-602.

During project construction or operation, both paved and unpaved roadways and streets must be managed in a manner that prevents excessive amounts of particulate matter from becoming airborne. This may be accomplished through temporary paving, dust suppressants, watering, detouring, and reducing speed limits on unpaved and graveled roads, or by other effective means.

Dust generated from materials handling, conveyance, or transport (including during construction) must be managed to prevent particulate matter from becoming airborne. Appropriate precautions include wetting the material, covering the load, using spray bars, applying dust suppressants and preventing "trackout."

Storage piles that may produce dust (such as aggregate and sand) must be managed using chemical stabilization, wetting, or covering to prevent excessive particulate matter from becoming airborne.

Article 7: Existing Stationary Source Performance Standards

The general provisions of Article 7 include limitations on opacity of plumes from point and stationary sources. This limitation would apply to any diesel-fired emergency equipment installed at the proposed facility. A.A.C. R18-2-703 limits particulate matter emissions from fuel-burning equipment. In addition, recordkeeping requirements and fuel limitations applicable to fuel-burning equipment are discussed in A.A.C. R18-2-719.

Article 8: Emissions from Mobile Sources (New and Existing)

The provisions of Article 8 limit the opacity of exhaust emissions from, and dust caused by operation of, off-road machinery, heater/planer units, roadway and site cleaning machinery and asphalt or tar kettles. Most of the self-propelled construction equipment used on the Project, such as dozers, loaders, graders and belly-dumpers would meet the definition of off-road machinery. The opacity limitation for off-road machinery is 40 percent for any period greater than 10 seconds. Visible emissions when starting cold equipment is exempt for the first 10 minutes. The opacity limit for asphalt or tar kettles is 40 percent for any period greater than 10 seconds.

Article 9: New Source Performance Standards

New Source Performance Standards (NSPS) have been established by USEPA to limit air pollutant emissions from certain categories of new and modified stationary sources. ADEQ has adopted these standards with a few changes. The NSPS regulations are contained in 40 CFR Part 60 and cover many different industrial source categories. If diesel-fired engines are installed to supply emergency or non-emergency power for the proposed Wind Farm Site or are used during construction, they would be regulated by the NSPS for diesel engines (compression ignition engines), 40 CFR Part 60, Subpart IIII. Emissions from the generator(s) would be required to comply with Table 1 within NSPS Subpart IIII. If the proposed Project utilizes an emergency fire pump, it would be covered under 40 CFR Part 60, Subpart IIII. Table 4 within NSPS Subpart IIII is applicable to emergency fire pump engines. The non-methane hydrocarbon and NOx emissions standard for equipment manufactured in 2009 or later also is likely to apply to the equipment selected for the proposed facility.

Article 17: Arizona State Hazardous Air Pollutants Program

Definitions of major, minor and de minimis sources of HAPs are included in A.A.C. R18-2-1701. Stationary sources with the potential-to-emit more than 10 tons of any single HAP or 25 or more tons of any combination of HAPs are major sources. Sources emitting between 1 and 10 tons of any single HAP or between 2.5 tons and 25 tons of total HAPs are minor sources. Table 1 in A.A.C. R18-2-1701 lists de minimis levels for specific HAPs in both pounds per hour and pounds per year. Based upon the information provided for the proposed Project, limited amounts of HAPs may be used during maintenance activities. HAPs are also emitted during the combustion of fossil fuels.

Mohave County Requirements

The Mohave County Development Services Department, Building Division, requires a permit for projects that include grading. A grading permit is required for the Project since more than 5,000 cubic yards would be graded. Submittal information is listed under “Engineered Grading Requirements.” No specific air quality ordinances have been enacted within Mohave County (Mohave County 2010).

3.2.3 Existing Conditions

Ambient air quality in northwest Arizona is generally good. However, few air quality monitoring stations are positioned near the Project Area, so available data are limited. An active visibility monitor is located within Lake Mead NRA and at GCNP. These monitors measure aerosol particles that create haze when sunlight encounters particles of pollution in the air. Light is either absorbed by the particles or scattered by them, resulting in a reduction of clarity and color for the observer. The NPS and other agencies monitor air quality in our national parks to protect and improve visibility. Table 3-3 presents a summary of monitoring data from 2004 through 2008 at Lake Mead NRA and GCNP. The data are presented in deciviews. Higher deciview values indicate worse visibility. In general, the average person is able to perceive a change of one deciview. It should be noted that visibility in cleaner environments is more sensitive to increases in particle concentrations than visibility in more polluted areas.

Table 3-3 Summary of Aerosol Monitoring Data from IMPROVE Network Monitors Located at Meadview and Grand Canyon National Park, Arizona

Year	Parameter	Meadview Annual Average (DV)	GCNP 2 Annual Average (DV)
2004	Aerosol	8.34	7.16
2005	Aerosol	8.48	7.56
2006	Aerosol	8.57	7.34
2007	Aerosol	8.67	7.87
2008	Aerosol	8.55	6.92

SOURCE: IMPROVE Network (2010)
NOTES: DV= deciviews

Mobile ozone monitors were used by the NPS to collect data on ozone levels from 2003 to 2006 (NPS 2010a). Summary data are presented in Table 3-4. Ozone is formed in a series of complex photochemical reactions involving NOx and volatile organic compounds (VOCs) in the presence of sunlight. Since ground-level ozone is the primary constituent in smog, it impacts visibility. Ozone presents a health hazard at ambient concentrations exceeding the ozone NAAQS.

Table 3-4 Days with 8-Hour Averages Exceeding Ozone Standard at Lake Mead National Recreation Area 2003-2006

Parameter	Applicable Standard	2003	2004	2005	2006
8-hour Ozone	0.8 ppm	1	2	3	1

SOURCE: National Park Service (2010) http://www.nature.nps.gov/air/monitoring/ads/ADSReport.cfm.
NOTES: This standard was established in 1997 and is the applicable standard for these monitoring years. The new standard of 0.075 ppm was effective May 27, 2008.

The nearest PM_{10} monitors in Mohave County are located in Bullhead City and Peach Springs, approximately 48 miles southerly and 36 miles easterly from the Project Area, respectively.

The area is known for moderate to strong, steady winds. High winds commonly create blowing dust and reduced visibility, except after significant rainfall. Wind data obtained from temporary met towers located within the Project boundary indicate winds blow primarily from the south and secondarily from the north-northeast (BP Wind Energy North America Inc. [BP Wind Energy]2009).

3.2.4 Climate Change

Ongoing scientific research has identified the potential impacts of anthropogenic (manmade) GHG emissions and changes in biological carbon sequestration due to land management activities on global climate. Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sequestration attributable to alterations in land cover such as croplands, pastures and forests are believed to cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat radiated by the Earth back into space. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused carbon dioxide equivalent, or CO_2e, concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. CO_2e is calculated by multiplying the mass of each GHG emitted by its global warming potential. As an example, CO_2 is used as the baseline and has a global warming potential of 1, whereas methane (CH_4) has a global warming potential of 72. Therefore, every 1 ton of CH_4 emitted is equivalent to the emission of 72 tons CO_2e. The Intergovernmental Panel on Climate Change (IPCC) concluded in 2007 that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations" (IPCC 2007b).

Global mean surface temperatures have increased nearly 1.8 °F from 1890 to 2006. Models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24°N) have exhibited temperature increases of nearly 2.1°F since 1900, with nearly a 1.8°F increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change (IPCC 2007b).

In 2001, the IPCC indicated that by the year 2100, global average surface temperatures would increase 2.5°F to 10.4°F above 1990 levels. The National Academy of Sciences has confirmed these findings, but also has indicated there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time enhancing heavy storm events. Although large-scale spatial shifts in precipitation distribution may occur, these changes are more uncertain and difficult to predict (IPCC 2007b).

Although there are uncertainties associated with the science of climate change, this does not imply that scientists do not have confidence in many aspects of climate change science. Some aspects of the science are known with virtual certainty, because they are based on well-known physical laws and documented trends.

Several activities contribute to the phenomena of climate change, including solar energy output, emissions of GHGs (especially CO_2 and CH_4) from fossil fuel development, large wildfires, decomposition of vegetation, and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over differing temporal scales. For example, recent emissions of CO_2 may influence the climate for 100 years (IPCC 2007a).

3.3 GEOLOGY, SOILS, AND MINERALS

3.3.1 Introduction

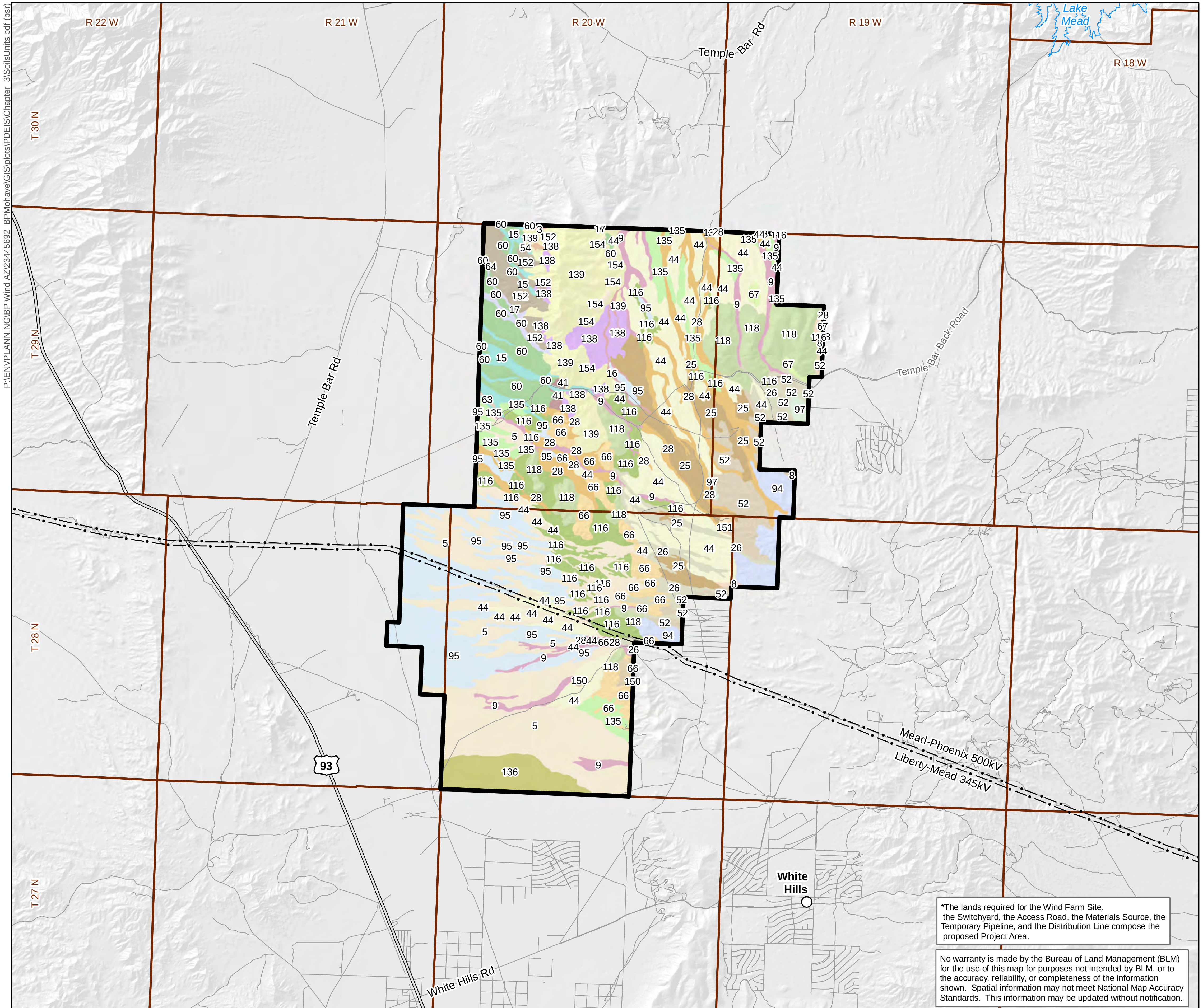
The geologic setting and geologic hazards assessment for the Project was based on a review of data gathered from the Natural Resources Conservation Service (NRCS), the Arizona Geological Survey (AZGS), the Arizona Department of Water Resources (ADWR), the U.S. Geologic Survey (USGS), the Mineral Resource Data System (MRDS) and general professional knowledge of soils in Arizona (USGS 2009, 2010, 2011a). These data were presented in the report "Geology and Geologic Hazard Assessment Report, Mohave County Wind Farm Project" (URS 2010a). It should be noted that the information published by the NRCS and AZGS provides general geologic information related to surficial soil conditions, which is defined as the upper 200 centimeters or approximately 6.5 feet. Section 3.3 provides general geologic constraints and hazards within the boundaries of the Project Area that is suitable for the purposes of this environmental analysis, but is not intended for making design and construction decisions.

3.3.2 Geologic Setting

The Project Area is located in the White Hills situated between the Detrital Valley Basin and the Colorado River to the west and the Hualapai Valley Basin to the east. The Colorado River runs through Lake Mead to the north and the Cerbat Mountains are south of the Project Area. The White Hills predominantly consist of Tertiary-aged sedimentary volcanics and intrusive igneous rocks (granite) unconformably adjacent to Precambrian-aged metamorphic rock. The Tertiary sedimentary rocks predominantly consist of sandstone, mudstone conglomerates, and unconsolidated sediments (sands and gravels). These sedimentary units generally outcrop at the lower elevations within the White Hills. Tertiary-aged tuffs and ash deposits generally outcrop at lower elevations within the White Hills. The Tertiary-aged basalt flows, Precambrian-aged gneiss and schist rocks form the cliffs and peaks of the White Hills. The Tertiary sedimentary deposits are the most susceptible to disturbance and it may become difficult to prevent wind erosion and blowing dust once any disturbance takes place.

3.3.3 Soils Overview

The 32 soil map units identified in the Project Area by the NRCS soil survey data are shown on Map 3-1, Soil Units. The soil types mapped in the Project Area have slopes ranging from 0 to 75 percent and generally consist of gravelly sandy clay loams to gravelly loamy sands. Areas of rock outcrop located within the northern portion of the Project Area cover approximately 6,300 acres.



Map 3-1
Soil Units

Mohave County Wind Farm Project

Legend

Wind Farm Site*

Soils

- 116; Razorback extremely gravelly sandy loam
- 118; Razorback-Rock outcrop complex
- 135; Skelon-Pinaleno families complex
- 136; Storybook very gravelly loam
- 138; Sunrock extremely gravelly sandy loam
- 139; Sunrock-Rock outcrop complex
- 150; Tumarion-Nickel family complex
- 151; Tumarion-Nickel family complex, moist
- 152; Tyro extremely stony sandy loam
- 154; Tyro-Sunrock complex
- 15; Carrizo complex
- 16; Carrizo-Riverwash complex
- 17; Carrizo-Riverwash complex
- 25; Deluge-Gotchell-Sunstroke complex
- 26; Detrital-Bluebird complex
- 28; Detrital-Nickel complex, dry
- 3; Appleseed-Huevi association
- 41; Goldroad-Rock outcrop complex
- 44; Gotchell-Sunstroke complex
- 52; Greyeagle-Skelon families complex, moist
- 54; Haplogypsids, eroded-Haplogypsids complex
- 5; Arizo-Detrital-Nickel complex
- 60; Huevi extremely cobbly sandy loam
- 63; Huevi-Carrizo complex
- 64; Huevi-Carrwash complex
- 66; Hulda extremely gravelly sandy loam
- 67; Hulda-Rock outcrop complex
- 8; Arizo-Riverwash complex
- 94; Nickel family-Bluebird complex
- 95; Nickel-Skelon family-Detrital complex
- 97; Nodman-Antares complex
- 9; Arizo-Riverwash complex, dry

Note: All soils in the project area are classified as Not Prime Farmland

General Features

- Community
- Existing Transmission Line
- U.S. Highway
- Township and Range Boundary
- Lake

Source:
Project Area Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009
SSURGO Soils: USDA 2011

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Soil properties for each soil type identified within the Project Area are shown in Table 3-5. Details regarding the soil survey data obtained from NRCS can be found in the Geology and Geologic Hazard Assessment Report (URS 2010a).

Table 3-5 Soil Properties of the Mohave County Wind Farm Project Area

Map Unit	Name	Acres	Percent of Site Coverage	Location within Wind Farm Site	Depth to Restrictive Layer - Lithic Bedrock	Shrink/ Swell Potential	Steel Corrosivity	Concrete Corrosivity
3	Appleseed-Huevi association, 4 to 30 percent slopes	21.69	0.05%	Northwest corner of Project Area	Assumed to be >11 in.	Low	High	Low
5	Arizo-Detrital-Nickel complex, 2 to 6 percent slopes	7,891.50	16.77%	Southern portion of Project Area	Assumed to be >75 in.	Low	High	Low
8	Arizo-Riverwash complex, 1 to 4 percent slopes	130.93	0.28%	Small portions in eastern Project Area	Assumed to be >75 in.	Low	High	Low
9	Arizo-Riverwash complex, dry, 0 to 1 percent slopes	1,466.71	3.12%	Small portions throughout western half of Project Area	Assumed to be >75 in.	Low	High	Low
15	Carrizo complex, 1 to 5 percent slopes	687.17	1.46%	Small portion in northwest corner of Project Area	Assumed to be >75 in.	Low	High	Low
16	Carrizo-Riverwash complex, 0 to 1 percent slopes	118.19	0.25%	Small portion in central Project Area	Assumed to be >75 in.	Low	High	Low
17	Carrizo-Riverwash complex, 3 to 8 percent slopes	214.17	0.46%	Northwestern portion of Project Area	Assumed to be >75 in.	Low	High	Low
25	Deluge-Gotchell-Sunstroke complex, 3 to 7 percent slopes	1,858.17	3.95%	Central and eastern portions of Project Area	Assumed to be >50 in	Low	High	Low
26	Detrital-Bluebird complex, 2 to 12 percent slopes	1,477.49	3.14%	Eastern and southeastern portions of Project Area	Assumed to be >75 in.	Low	High	Low
28	Detrital-Nickel complex, dry, 1 to 6 percent slopes	2,760.99	5.87%	Throughout central portion of Project Area	Assumed to be >75 in.	Low	High	Low
41	Goldroad-Rock outcrop complex, 35 to 65 percent slopes	76.15	0.16%	Small portion in west central part of Project Area	Assumed to be >7 in.	Low	High	Low
44	Gotchell-Sunstroke complex, 6 to 35 percent slopes	6,161.99	13.09%	Eastern and southern portions of Project Area	Assumed to be >27 in.	Low	NA	Low
52	Greyeagle-Skelon families complex, moist, 4 to 25 percent slopes	1,505.82	3.2%	Throughout eastern half of Project Area	Assumed to be >75 in.	Low	High	Low
54	Haplogypsids, eroded-Haplogypsids complex, 35 to 75 percent slopes	31.35	0.07%	Small portion in northwest corner of Project Area	Assumed to be >6 in.	NA	High	High
60	Huevi extremely cobbly sandy loam, 2 to 6 percent slopes	1,445.56	3.07%	Through western portions of Project Area	Assumed to be >75 in.	Low	High	Low
63	Huevi-Carrizo complex, 1 to 25 percent slopes	16.99	0.04%	Small portion in western Project Area	Assumed to be >75 in.	Low	High	Low
64	Huevi-Carrwash complex, 2 to 75 percent slopes	19.13	0.04%	Small portion in northwest corner of Project Area	Assumed to be >75 in.	Low	High	Low

Map Unit	Name	Acres	Percent of Site Coverage	Location within Wind Farm Site	Depth to Restrictive Layer - Lithic Bedrock	Shrink/ Swell Potential	Steel Corrosivity	Concrete Corrosivity
66	Hulda extremely gravelly sandy loam, 20 to 65 percent slopes	1,479.47	3.14%	Throughout central and southeast corner of Project Area	Assumed to be >7 in.	Low	High	Low
67	Hulda-Rock outcrop complex, 20 to 65 percent slopes	124.58	0.26%	Small portion of northeast corner and north central areas	Assumed to be >5 in.	Low	High	Low
94	Nickel family-Bluebird complex, 15 to 45 percent slopes	1,088.72	2.31%	Throughout eastern Project Area	Assumed to be >75 in.	Low	High	Low
95	Nickel-Skelon family-Detrital complex, 3 to 10 percent slopes	5,090.25	10.82%	Portions throughout southwest half of Project Area	Assumed to be >75 in.	Low	Moderate	Low
97	Nodman-Antares complex, 3 to 15 percent slopes	166.83	0.35%	Eastern Project Area	Assumed to be >38 in.	Low	High	Low
116	Razorback extremely gravelly sandy loam, 15 to35 percent slopes	2,586.39	5.5%	Throughout all of Project Area	Assumed to be >5 in.	Low	High	Low
118	Razorback-Rock outcrop complex, 20 to 70 percent slopes	2,853.60	6.06%	Central and northeast portion of Project Area	Assumed to be >5 in.	Low	High	Low
135	Skelon-Pinaleno families complex, 1 to 4 percent slopes	1,373.30	2.92%	Scattered throughout Project Area	Assumed to be >75 in.	Low	High	Low
136	Storybook very gravelly loam, 1 to 3 percent slopes	1,248.58	2.65%	Small portion is southwest corner of Project Area	Assumed to be >75 in.	Low	High	Low
138	Sunrock extremely gravelly sandy loam, 15 to 35 percent slopes	865.88	1.84%	Central and northern portions of Project Area	Assumed to be >5 in.	Low	High	Low
139	Sunrock-Rock outcrop complex, 30 to 65 percent slopes	3,118.95	6.63%	Central and northern portions of Project Area	Assumed to be >7 in.	Low	High	Low
150	Tumarion-Nickel family complex, 8 to 35 percent slopes	117.56	0.25%	Small portion in southwest corner of Project Area	Assumed to be >18 in.	Low	High	Low
151	Tumarion-Nickel family complex, moist, 5 to 40 percent slopes	65.54	0.14%	Small portion in southeast part of Project Area	Assumed to be >18 in.	Low	High	Low
152	Tyro extremely stony sandy loam, 3 to 35 percent slopes	864.73	1.84%	Small portion in Northwest part of Project Area	Assumed to be >16 in.	Low	High	Low
154	Tyro-Sunrock complex, 3 to 15 percent slopes	137.24	0.29%	Northern portion of Project Area	Assumed to be >75 in.	Low	High	Low

SOURCE: U.S. Department of Agriculture, Natural Resources Conservation Service 2009

Not included in Table 3-5 are the soil units and corresponding data associated with the ROW proposed for the primary access road, distribution line, and water pipeline proposed from US 93 to the Wind Farm Site. The current geological condition of these potential features is discussed in Section 3.3.13.

3.3.4 Geologic Hazards

Available data were reviewed to identify potential geologic hazards within the Project Area, including collapsible soils, shrink/swell potential, earth fissures, land subsidence, depth to bedrock, soils with a high potential to corrode steel or concrete, seismicity, sinkholes, and landslides. Details regarding these hazards can be found in the Geology and Geologic Hazard Assessment Report (URS 2010a).

The findings from the data review indicate that the Project Area may be subject to the geologic hazards described in the following sections. These descriptions are based on readily available data, which did not include specific laboratory testing results. Specific impacts associated with these hazards are addressed in Section 4.3 of this Environmental Impact Statement (EIS).

3.3.5 Collapsible Soils

The site is located in a depositional basin of the Basin and Range province, which generally consists of young alluvial deposits. These young alluvial deposits can have a potential for collapse when inundated or saturated. Therefore, it should be assumed that collapsible soils are present within the Project Area.

3.3.6 Shrink/Swell Potential

According to available NRCS data, the shrink/swell potential of the shallow soils is low throughout the Project Area.

3.3.7 Earth Fissures/Land Subsidence

No earth fissures or land subsidence are recorded within or near the Project Area.

3.3.8 Approximate Bedrock Location

The depth to bedrock constraints were evaluated based on the NRCS soils data for the Project Area. It was determined that there was not sufficient information available for the Project Area to give definitive depths to many of the restrictive layers. Based on NRCS data, it is speculated that the depth to bedrock ranges from 5 inches to greater than 75 inches with the majority of the bedrock being greater than 75 inches.

3.3.9 Corrosion of Concrete and Steel

The NRCS soils survey data indicate that the shallow soils of the entire site have high steel corrosion potential and low concrete corrosion potential. High steel corrosion is not uncommon in arid Southwest soils. The corrosion potential of soils is generally managed through the appropriate selection of materials during design and is typically evaluated as part of a more detailed geotechnical investigation for the Project Area.

3.3.10 Seismic Analysis

An evaluation was performed to determine the probable future seismic events for the Project Area by reviewing the available 2008 USGS mapping data of Quaternary-aged faults (about 1.6 million years ago to present) and peak ground acceleration in Arizona. These mapping data depict recent (geologic time scale) faulting in proximity to the Project Area and provide an estimate of the peak ground acceleration for the site. Peak ground acceleration is defined as the maximum acceleration a particle will experience during an earthquake (USGS 2007).

The USGS mapping data indicate there are eight faults that are either completely or partially encompassed within a 50-mile radius of the Project Area. There are no known Quaternary faults presently mapped within the Project Area. The nearest faults are approximately 15 miles from the center of the Project Area to the west and northeast and date to the Mid Quaternary era (750,000 to 130,000 years ago). The nearest fault with recent activity is the Lavic Lake fault in California, which is approximately 140 miles to the southwest and dates to the Late Quaternary era (130,000 years ago to present). This fault was last active in 1999 during the Hector Mine Earthquake, which registered magnitude 7.1 on the Richter magnitude scale. The fact that there are no Quaternary faults presently mapped within the Project Area does not mean that faults are not present; there are older faults within the Project Area that have been dormant dating back to more than 10 million years ago during the formation of the basin. These older dormant faults are shown on Map 3-2, Geology.

Based on the USGS mapping data, the peak ground acceleration with a 2 percent probability of exceedance in a 50-year period is estimated to be 0.14 g (where g is the gravitational constant of 32.2 feet per second per second (time squared) and 0.14g = 0.14*32.2 feet per second per second = 4.51 feet per second per second) for the Project Area. The peak ground acceleration with a 10 percent probability of exceedance in a 50-year period is estimated to be 0.06 g (0.06*32.2 feet per second per second = 1.93 feet per second per second) for the Project Area.

3.3.11 Landslides/Soil Erosion

There are several areas within the Project Area that contain highly or potentially highly erodible soil units as shown in Map 3-3, Soil Erosion, with 1:100,000 USGS Quads. The erodible lands that are on steep slopes (≥50 percent) are considered at high risk for landslides, rockslides, and debris slides. Areas of high susceptibility to erosion within the western half of the Project Area include Squaw Peak in the northwest, a rock outcrop in the northeast, and the base of Senator Mountain on the eastern edge of the Wind Farm Site. Structures at the toe and crest of these highly erodible and potentially highly erodible slopes may be at risk of landslides.

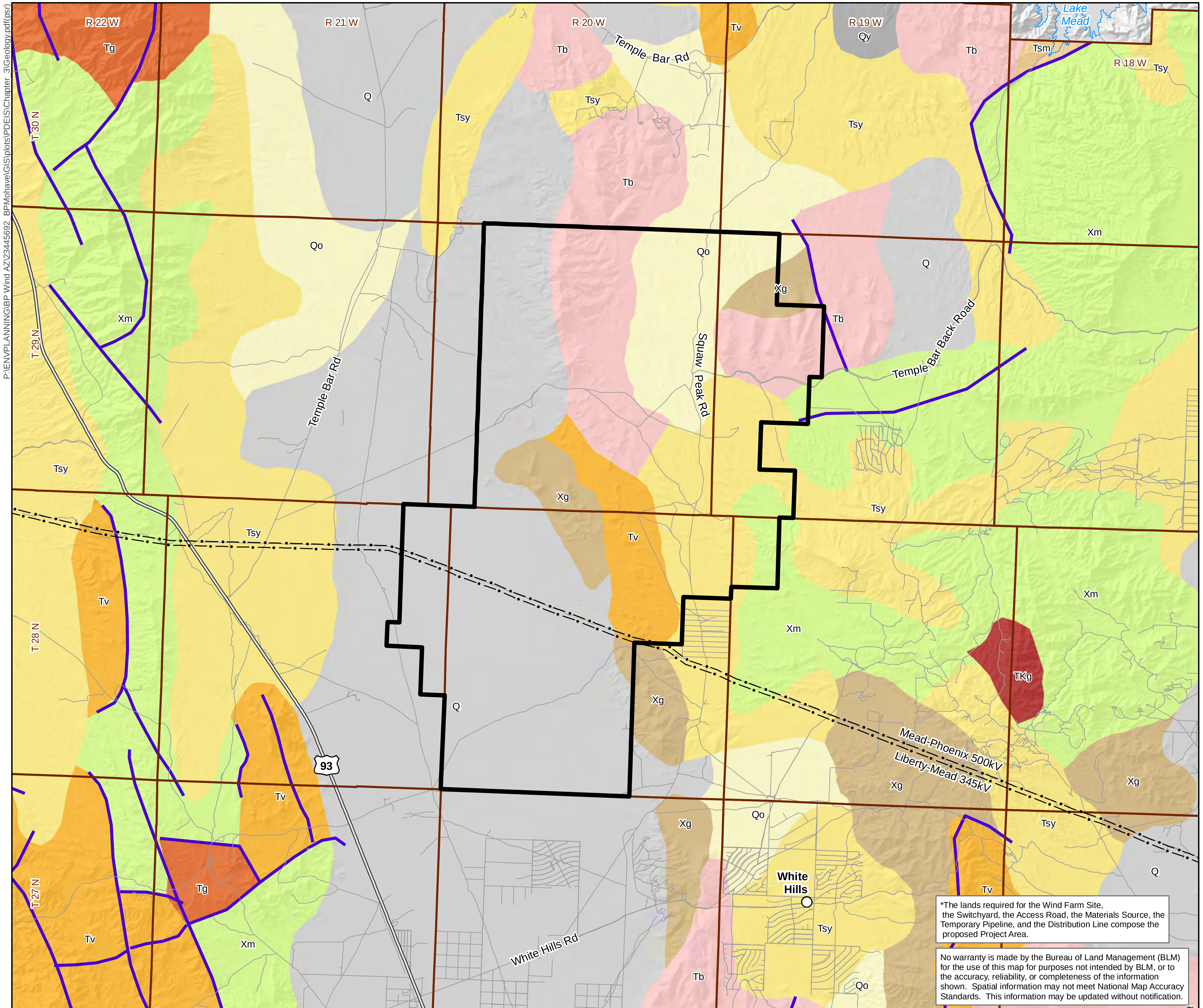
3.3.12 Mineral Resources/Mining

Minerals are not a true geologic hazard, but can affect the design and/or construction of the Project. Map 3-4, Mineral Data, portrays the minerals within and near the Project Area which include Federal mineral reserves, mineral districts, potential mining claims, and historic mining areas.

Near the Project Area, there are several closed mine sites, prospect sites, and other mineral features. The area with the most significant mining activity is approximately 10 miles southeast of the center of the Project Area in the White Hills Mineral District (shown on Map 3-4). This area contains approximately 20 closed mines and one prospect site that have been mined primarily for gold and silver with some beryllium. Approximately 8 miles south of the Project Area is a prospect site for uranium, lead, and zinc. North of the proposed Wind Farm Site are mine prospect sites for uranium (carnotite and uranophane), gypsum, selenite, and calcite. The western edge of the Project Area shares a boundary with a sodium potassium deposit. East of the Project Area is an assortment of mines and prospects for gold, mica, quartz, and tungsten. The Project is within an area where all Federal minerals are available for mining, but it is an area of low favorability for mineral mining. According to the Bureau of Land Management (BLM) mineral database, the Project Area is not in a mining district and there are no active mining claims within the proposed Wind Farm Site.

3.3.13 Primary Access Road, Distribution Line, and Temporary Water Pipeline

The current geological, soil, and mineral conditions associated with the primary access road connecting US 93 to the Wind Farm Site (see Map 2-1), the water pipeline and distribution line within the ROW of this road, and the nearby materials source are similar to those of the Wind Farm Site, as described above. Collapsible soils, shrink/swell potential, corrodibility, and seismic analysis for these areas should be similar to those described in the above sections, but should be verified and determined in conjunction with a formal geotechnical investigation.



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Map 3-2
Geology

Mohave County Wind Farm Project

Legend

Wind Farm Site*

Geology Features

- Fault
- Qy - Young alluvium (Holocene to latest Pleistocene)
- Q - Surficial Deposits (Holocene to middle Pleistocene)
- Qo - Older Surficial Deposits (middle Pleistocene to latest Pliocene)
- Tsy - Sedimentary Rocks (Pliocene to middle Miocene)
- Tb - Basaltic Rocks (late to middle Miocene; 8 to 16 Ma.)
- Tsm - Sedimentary Rocks (middle Miocene to Oligocene; 15 to 38 Ma.)
- Tv - Volcanic Rocks (middle Miocene to Oligocene; 15 to 38 Ma.)
- Tg - Granitoid Rocks (early Miocene to Oligocene; 18 to 38 Ma.)
- TKg - Granitic Rocks (early Tertiary to late Cretaceous; 45 to 75 Ma.)
- Xg - Granitoid Rocks (early Proterozoic; 1400 Ma. or 1650 to 1750 Ma.)
- Xm - Metamorphic Rocks (early Proterozoic; 1650 to 1800 Ma.)

General Features

- Community
- Existing Transmission Line
- U.S. Highway
- Township and Range Boundary
- Lake

Source:
Project Area Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009
Geology and Faults: BLM 2009

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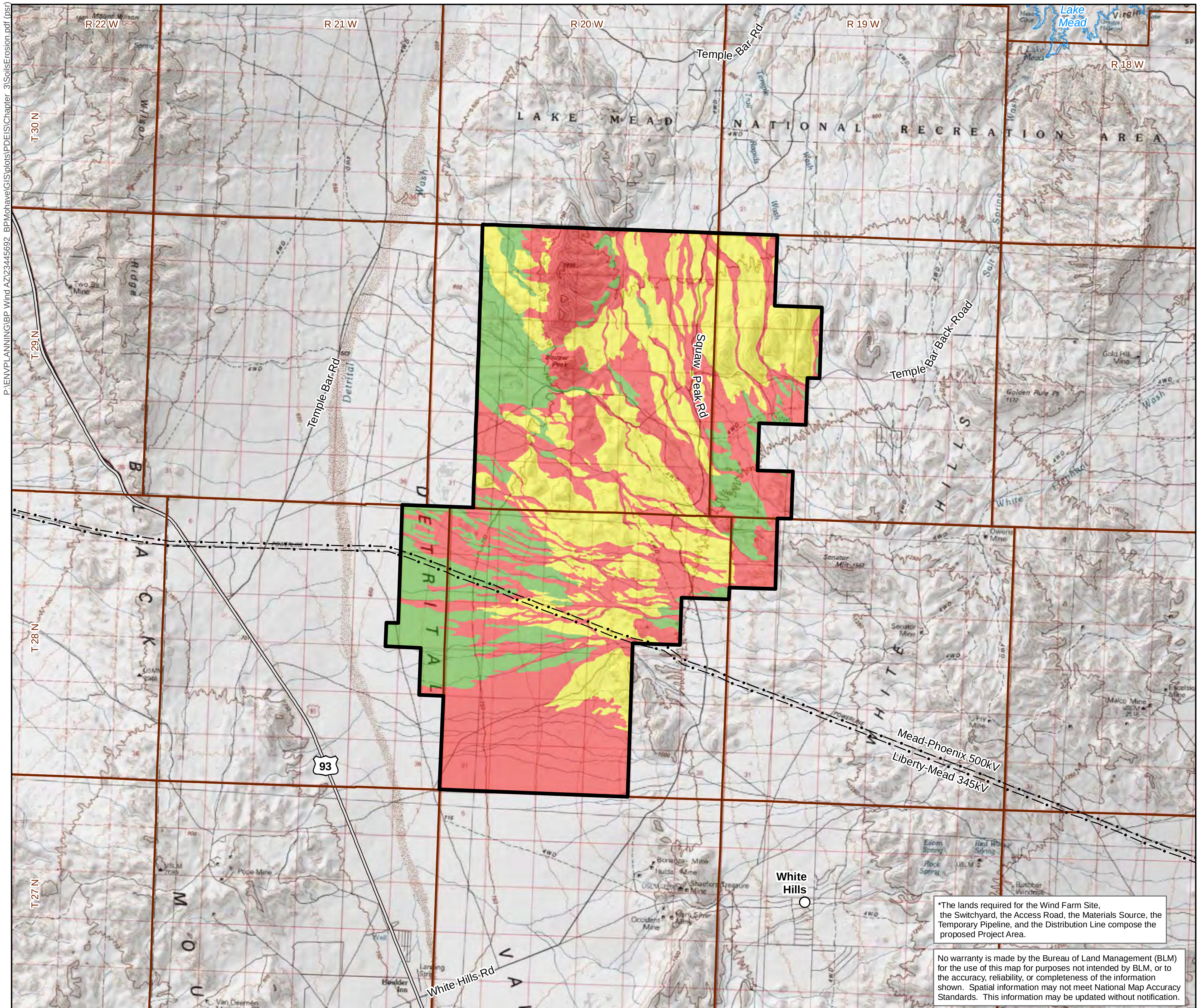

Map 3-3
Soil Erosion

Mohave County Wind Farm Project

Legend

Wind Farm Site*

Soil Erosion Based on Wind and Water

- Not highly erodible land
- Potentially highly erodible land
- Highly erodible land

Soil Unit ID	Erosion Status
15, 17, 52, 60, 63, 64, 95, and 154	Not highly erodible land
44, 66, 67, 116, 118, 138, 150, and 152	Potentially highly erodible land
3, 5, 8, 9, 16, 25, 26, 28, 41, 54, 94, 97, 135, 136, 139, and 151	Highly erodible land

Note:
All soils in the project area are classified as Not Prime Farmland

General Features

- Community
- Existing Transmission Line
- U.S. Highway
- Township and Range Boundary
- Lake

Source:
Project Area Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008
SSURGO Soils: USDA 2008
Base topographic data created with Copyright:© 2011 National Geographic Society, i-cubed

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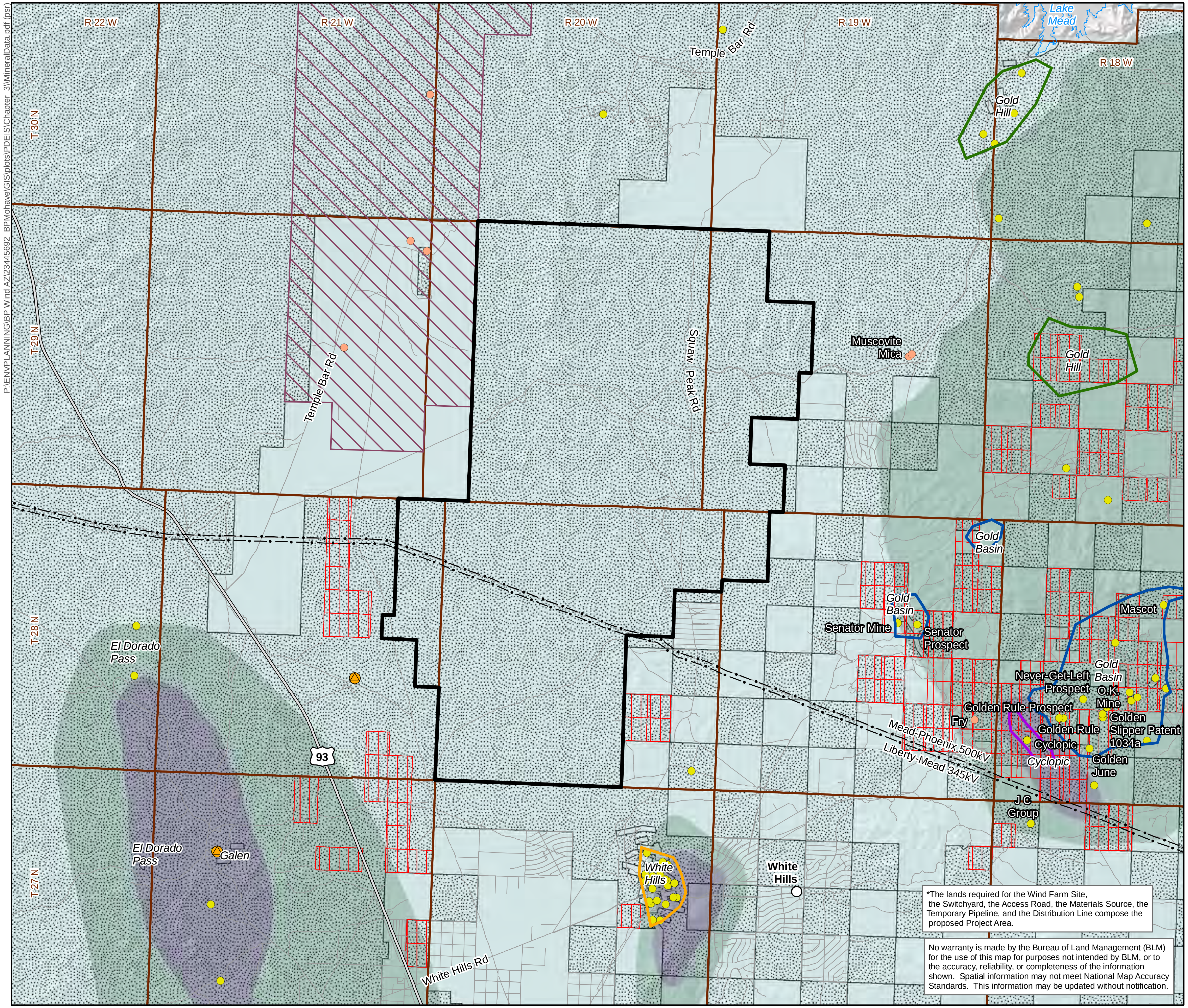

Map 3-4
Mineral Data

Mohave County Wind Farm Project

Legend

Wind Farm Site*

Mining and Mineral Features

Federal Minerals (Open to All Minerals)

Prospectively Valuable Sodium Potassium

Mining Claims

Potential Mining Claim

Mineral Districts

Cyclopic

Gold Basin

Gold Hill

White Hills

Mineral Favorability

Low

Moderate

High

Mineral Resource Data System (MRDS) Commodity

Metallic

Non-metallic

Fry Historic Mining Area Name

Historic Mining Areas within Project Area:
Cyclopic, Golden June, Golden Rule, Golden Rule Prospect, Golden Slipper Patent 1034a, JC Group, Mascot, Never-Get-Left Prospect, O.K. Mine, Senator Mine, Senator Prospect, Fry, and Muscovite Mica (2 sites).

General Features

Community

Existing Transmission Line

U.S. Highway

Road

Township and Range Boundary

Lake

Source:
Project Area Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009
Mining and Mineral Data: BLM 2009

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3.4 WATER RESOURCES

3.4.1 Introduction

This section includes a description of the existing conditions for water resources that include watersheds, water quality, streams (washes), floodplains, groundwater, and wells. Existing conditions for water resources have been characterized based on review of the USGS National Hydrography Dataset (NHD), Federal Emergency Management Agency (FEMA) floodplain data, the ADEQ Draft 2010 Status of Water Quality Integrated 305(b) Assessment and 303(d) Listing Report (ADEQ 2011), ADWR data, Mohave County's Water Quality Management Plan, the preliminary Jurisdictional Delineation of Waters of the United States for the project accepted by the USACE, and the BLM Resource Management Plan (RMP) for Kingman, Arizona.

3.4.2 Regional Overview

A watershed is a hydrologically defined geographic area that includes both groundwater and surface water flow (USEPA 2010a); therefore, watersheds are the basis of the regional analysis for water resources in this EIS. The three regional watersheds that are connected to the Project are the Lower Detrital Wash, Middle Detrital Wash, and Trail Rapids Wash-Lower Colorado River (see Map 3-5, Water Resources). These are watersheds are discussed in detail below.

3.4.3 Project Area Conditions

3.4.3.1 Watershed Boundaries and Water Quality

Watershed health is important to Federal and state agencies as a means for protecting water quality. The BLM Land Use Planning Handbook encourages a watershed-based approach for land management and requires BLM to identify watersheds that may need special protections for human health concerns, ecosystem health, or other public uses. Further, BLM must ensure that proper measures are taken for enhancing watershed functions and conditions (BLM 2005c).

The four Project action alternatives for the Wind Farm Site encompass between 34,720 and 47,059 acres divided among three different watersheds: Lower Detrital Wash, Middle Detrital Wash, and Trail Rapids Wash-Lower Colorado River. Under all Project action alternatives, the majority of the proposed Wind Farm Site would be located within the Lower Detrital Wash watershed. Table 3-6 shows the affected acreage within each surface watershed under the four Project action alternatives. For comparison, the Lower Detrital Wash watershed encompasses about 151,420 acres, the Middle Detrital Wash watershed encompasses about 190,454 acres, and the Trail Rapids Wash-Lower Colorado River watershed encompasses 115,596 acres (USDA, NRCS and University of Arizona 2007).

Table 3-6 Watersheds Potentially Affected by Project Action Alternatives

Watershed	Acres by Project Action Alternatives			
	Alternative A	Alternative B	Alternative C	Alternative E
Lower Detrital Wash	38,188	30,564	31,073	31,432
Middle Detrital Wash	881	0	0	881
Trail Rapids Wash – Lower Colorado River	7,991	4,156	4,229	5,797
TOTAL ACRES	47,060	34,720	35,302	38,110

NOTE: This table indicates overall acreage within the Project Area and not specific surface disturbance estimates.

The Clean Water Act (Section 303[d]) requires states, Tribes, and territories to develop lists of impaired waters, which do not meet established water quality standards. Based on information in ADEQ's 2006/2008 305(b) Assessment Report and 303(d) Impaired Waters list Assessment Report, no impaired waterways have been identified in the Project Area. There are no surface waters identified as an Outstanding Arizona Water within the Project Area according to Arizona Administrative Code, R18-11-112 (ADEQ 2012). ADEQ Water Quality Standards for surface water are prescribed in Title 18, Chapter 11, Article 1 of the A.A.C. This Code also includes the Department's designated uses of surface water as a means for developing numerical water quality criteria to maintain and protect surface waters (A.A.C. R18-11-104[c]).

3.4.3.2 Annual Precipitation and Surface Water

Annual precipitation on the valley floors of Mohave County ranges from about 5 to 10 inches (Western Regional Climate Center 2005, cited in Anning et al. 2007). No perennial surface waters are present within the Project Area. However, as is typical of arid Southwest environments, numerous ephemeral desert washes traverse the Project Area. These ephemeral washes only flow during storm events and are often sources of flash floods. Flow in the ephemeral washes during storms occurs in a northerly direction, draining towards Lake Mead and ultimately into the Colorado River (USGS 2008).

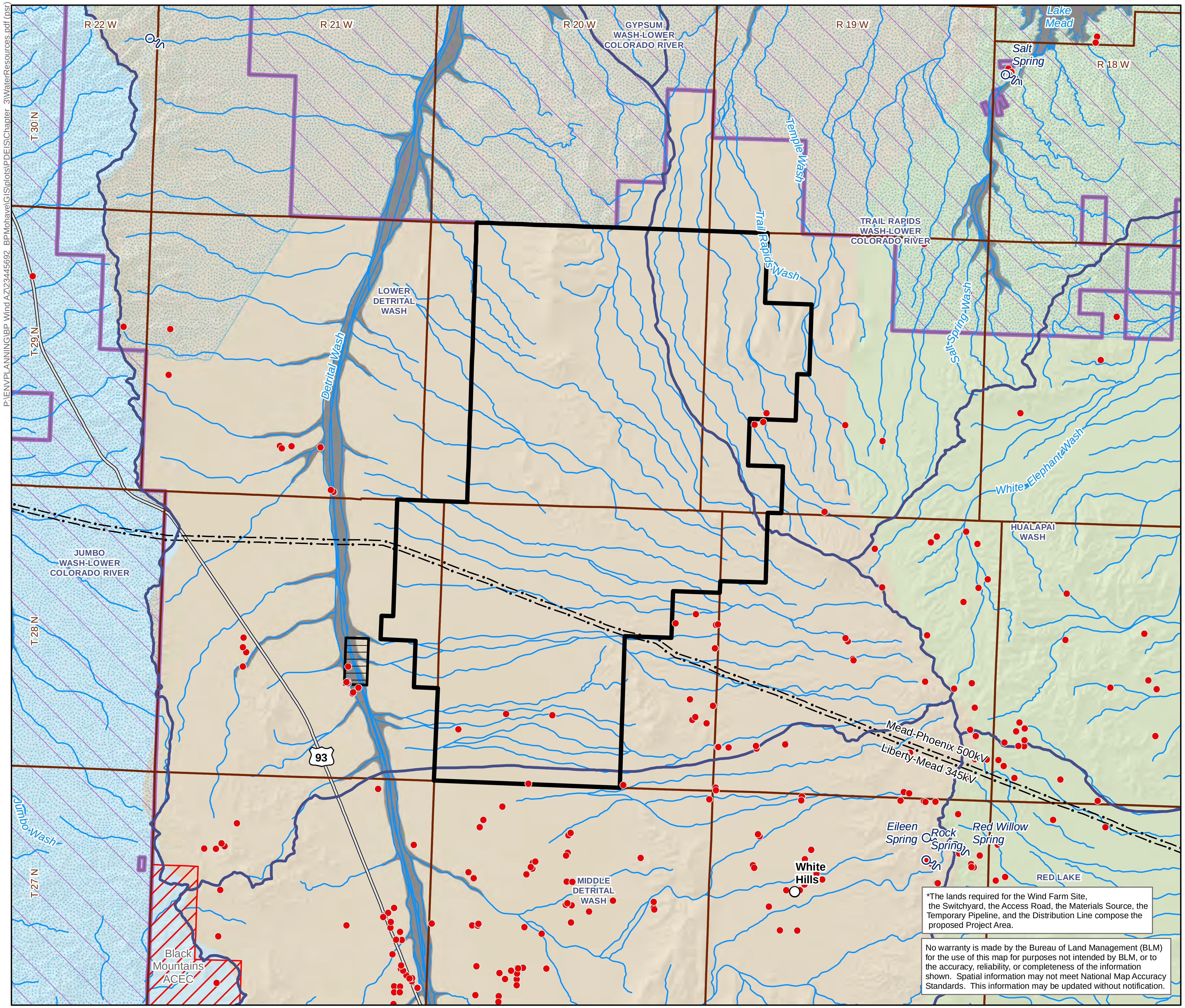
The nearest springs to the Project Area occur approximately 6 miles southeast of the Wind Farm Site near the White Hills Community (Map 3-5, Water Resources). Springs could be a source for wetland conditions; however, according to the USFWS National Wetlands Inventory, no wetlands have been mapped within the Project Area (EcoPlan 2011). If potential wetlands are identified as the Project progresses, formal wetland delineations would occur along with delineations of jurisdictional waters of the United States. Jurisdictional waters of the United States are described below in Section 3.4.3.3, Streams (Washes).

3.4.3.3 Streams (Washes)

Based on USGS NHD data from 2010, Trail Rapids Wash is the only named stream within the Wind Farm Site. This wash traverses the northeastern portion of the site, flowing to the north and ultimately into Lake Mead (Map 3-5). Another named stream, Temple Wash, originates just north of the Project Area and flows into Trail Rapids Wash.

Map 3-5 shows that the Wind Farm Site encompasses approximately 25 unnamed ephemeral desert washes and approximately 10 tributaries. Most of the unnamed washes are in the Lower Detrital Wash watershed and flow to the west or northwest into a drainage channel called Detrital Wash. This wash, located a few miles west of the Wind Farm Site (Map 3-5), flows north to its confluence with Lake Mead at Bonelli Bay. The USGS recorded peak flow data on Detrital Wash from 1963 to 1980 near Chloride, Arizona (south of the Project Area). During that time, annual peak flow ranged from zero to 470 cubic feet per second (cfs) (USGS 2011b). In most cases, peak flow on the wash occurred between July and September during the monsoon season.

A preliminary jurisdictional delineation was completed in December 2011, which indicated the presence of about 93.8 acres of potential jurisdictional waters within the Project Area. These consist of ephemeral drainages; no perennial or intermittent streams, wetlands, or other types of jurisdictional waters occur (EcoPlan 2011). USACE accepted the preliminary Jurisdictional Delineation report on June 8, 2012 and had decided to treat "all waters and wetlands that would be affected in any way by the permitted activity on the site as if they were a jurisdictional water of the U.S." The Phoenix, Arizona Regulatory Office of the USACE would process any necessary permits in accordance with the Clean Water Act Section 404 (dredge and fill) and ADEQ would review the activities and provide conditions for protecting water quality to issue a Section 401 (water quality) permit for inclusion in the Section 404 permit.



Map 3-5
Water Resources

Mohave County Wind Farm Project

Legend

- Wind Farm Site*
- Materials Source
- National Park Service Lake Mead National Recreational Area Boundary
- Bureau of Land Management Area of Critical Environmental Concern (ACEC)

Water Resources

- Well
- Spring
- Wash or Stream
- 100-Year Floodplain (Zone A)
- Undetermined Flood Hazard (Zone D)
- Watershed Boundary

Groundwater Basins

- Detrital Valley
- Hualapai Valley
- Lake Mohave

Note:
Area in map extent beyond 100-year Foodway and Undetermined Flood Hazard is designated as Zone X; area determined to be outside the 100-year and 500-year floodplain.

General Features

- Community
- Existing Transmission Line
- U.S. Highway
- Township and Range Boundary
- Lake

Source:
Project Area Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009
Springs, Streams, Watersheds, ACEC, Groundwater Basins: BLM 2009
Floodplains: FEMA 2009
Lake Mead Recreation Boundary: National Park Service, 2009
Wells: ADWR 2009
Base topographic data created with Copyright:© 2011 National Geographic Society, i-cubed

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3.4.3.4 Floodplains

Under Executive Order 11988, federal agencies are to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. As shown on Map 3-5, no designated 100-year or 500-year floodplains occur within or directly adjacent to the Project Area. The FEMA designates floodplain zones. When an area is designated as "Zone A," it indicates the area is "subject to inundation by the 1-percent-annual-chance flood event." The Zone A designation does not include floodways, which occur within floodplains and inhibit development encroachment activities (FEMA, Map Service Center 2011). The nearest designated 100-year floodplain is located around Detrital Wash just west of the Project Area in Township 28 North, Range 21 West (Map 3-5). FEMA-designated floodplain Zone D abuts the northwestern and the northeastern most boundaries of the Project Area. The Zone D designation is described as an Undetermined Flood Hazard by FEMA, which means no analysis of flood hazards has been conducted.

An existing rock and gravel quarry, located to the west of the proposed Wind Farm Site and adjacent to the main access road from US 93, is within the 100-year floodplain. Activities at the quarry were permitted previously by Mohave County and the U.S. Army Corps of Engineers (USACE).

3.4.3.5 Groundwater and Wells

As shown on Map 3-5, the Project Area is located within the Colorado River Basin hydrographic area which encompasses the Detrital Valley and the Hualapai Valley groundwater basins. The Project footprint lies entirely within the Detrital Valley groundwater basin. The Hualapai Valley groundwater basin is located about one mile east of the Project Area at its closest point.

Both the Detrital and Hualapai Valley groundwater basin are part of the Basin and Range Physiographic Province, which extends throughout the western United States to include southern and western Arizona. This Province was shaped during the Tertiary Period when structural deformation formed a series of alternating mountain ranges and basins on adjacent sides of high-angle normal faults. The valleys represent the basins, or downthrown fault blocks, and the adjacent mountain ranges represent the up-thrown fault blocks. As the mountain blocks were uplifted and eroded, sediment was carried by streams into the basins and deposited as alluvial fans. In the Detrital and Hualapai valleys, these basin-fill sediments range in thickness from thin veneers along the mountain fronts to more than 5,000 feet in parts of each basin (Freethey et al. 1986).

In both valleys, the basin-fill material has been divided into older, intermediate, and younger alluvium deposits (Gillespie and Bentley 1971). The older alluvium is stratigraphically the oldest and deepest deposit, and consists of moderately consolidated fragments of eroded rock from the surrounding mountains in a silty-clay or sandy matrix. The intermediate alluvium is younger and shallower and contains boulder- to pebble-sized fragments near the mountains, and gravel, sand, and silt in the middle of the valleys. Thickness of the intermediate alluvium is on the order of a few hundred feet (Gillespie and Bentley 1971). The younger alluvium overlies the intermediate layer and consists of Holocene and Pleistocene weakly-consolidated piedmont, stream, and playa deposits. This younger layer tends to be thinner than the intermediate and older alluvium.

Collectively, the older, intermediate, and younger alluvium form a water bearing unit commonly referred to as the Basin-Fill aquifer. In the Detrital Valley basin, the intermediate and younger alluvium are above the water table in most areas (Gillespie and Bentley 1971). As a result, extractable groundwater is generally contained within the older alluvium.

The Detrital Valley groundwater basin slopes downward to the north to its eventual terminus at Lake Mead. Groundwater flow within the Basin-Fill aquifer is also to the north, although the northern part of the aquifer lacks wells for defining groundwater levels and flow directions with much accuracy. Groundwater elevations in the Detrital Valley Basin-Fill aquifer vary from greater than 2,200 feet in the southern part of the basin to less than 1,300 feet in the northern part near Lake Mead (Anning et al. 2007). These elevations correspond to groundwater depths that range from 20 feet below ground surface near Lake Mead to as much as 984 feet below ground surface in the southern part of the basin (Mohave County 2003; Anning et al. 2007). In 1990-1991 and 2003-2004, groundwater levels were relatively stable in wells with measurements collected, although water levels for different time periods show long-term declines in an area northeast of Dolan Springs as a result of pumping (Anning et al. 2007).

Groundwater wells with measured yields in the Detrital Valley basin are mostly located outside the Project Area near Dolan Springs and Temple Bar. Reported well yields from the Basin-Fill aquifer range from less than 100 gallons per minute (gpm) up to 500 gpm (ADWR 2009). In the Hualapai Valley basin, the least productive wells also typically have 100 gpm well yields or lower. However, more productive wells in this basin can exhibit much higher yields in excess of 2,000 gpm (ADWR 2009).

Groundwater quality in the Detrital Valley basin is known to be suitable for most purposes, although concentrations of radionuclides and arsenic that exceed drinking water standards have been measured at some wells (ADWR 2009).

Five wells are located within the Wind Farm Site, as shown on Map 3-5. There are also five existing water wells at the Materials Source, three of which have been proposed to serve construction water needs, including batch plant operations and dust suppression. The five wells at the Materials Source are likely completed in the Basin-Fill aquifer and have permitted pumping rates up to 60 gpm.

The wells at the Detrital Wash Pit are located in Township 28 North, Range 21 West along the proposed site access road from US 93. In 2007, Mason and others completed a study to estimate total recoverable groundwater by township in the Basin-Fill aquifer throughout the Detrital Valley basin. The estimates were prepared for several depth ranges using three different values of specific yield: 3, 6, and 8 percent. Within 1,200 feet of land surface, potential recoverable groundwater in Township 28 North, Range 21 West was estimated between 239,000 and 637,000 acre-feet (Mason et al. 2007). The smallest value of this range was derived using a specific yield of 3 percent, while the highest value was derived using a yield of 8 percent. It should be noted that some of the estimated groundwater in storage may not be economically recoverable due to the location of future production wells, local variations in the saturated thickness of the Basin-Fill aquifer, and heterogeneous aquifer properties that may inhibit the feasibility of pumping.

Table 3-7 shows water resources present on land managed by the BLM and Bureau of Reclamation (Reclamation). The existing conditions for water resources not listed in Table 3-7 are the same across all land jurisdictions.

Table 3-7 Summary of Water Resource Considerations

Water Resource Consideration	Land Manager for Site	
	Bureau of Land Management	**Bureau of Reclamation**
Surface Watersheds (Alternative A only)	4,154 - 7,991 acres of Trail Rapids Wash-Lower Colorado River watershed (6.5 – 12.5 sq mi) 25,948 - 29,228 acres of Lower Detrital Wash watershed (40.5 – 45.7 sq mi) 881 acres of Middle Detrital Wash watershed (1.4 sq mi, Alternative A only)	3,844 - 8,966 acres of Lower Detrital Wash watershed (6 – 14 sq mi)
Steams (Washes)	Site crossed by Trail Rapids Wash	
Jurisdictional Waters	About 74 miles (93.8 acres) of potentially jurisdictional washes on site (across all land managers)	
Groundwater Basins	27,033 acres in Detrital Valley groundwater basin (42.2 sq mi)	8,922 acres in Detrital Valley groundwater basin (14 sq mi)
Wells	Five existing wells (within the Wind Farm Site)	No existing wells

NOTE: sq mi = square miles

3.5 BIOLOGICAL RESOURCES

The biological resources associated with the proposed Project are described in this section of the EIS. This includes local resident species and species that may temporarily use the Project Area during migration or during some seasons of the year.

The BLM manages habitat for biological resources on public lands it administers, which is part of its multiple-use mandate under the Federal Land Policy Management Act (FLPMA) of 1976 (43 United States Code [U.S.C.] 1701). Also NEPA requires Federal agencies to consider impacts to biological resources as part of the affected environment in project planning and land management (42 U.S.C. 4321). BLM management of biological resources includes vegetation, wildlife, natural communities, special status species, and landscape-scale connections. Landscapes are connected geographical regions that have similar environmental characteristics, such as the Sonoran Desert and can span BLM administrative boundaries. For the purposes of this analysis, Reclamation is incorporating BLM's management strategy for biological resources on Reclamation-administered land to provide consistency in data collection, analysis, construction, reclamation, and monitoring activities.

Federal and Arizona State legislation, policies, and regulations applicable to biological resources in the Project Area are described as follows:

The Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) provides a program for the conservation of threatened and endangered plants and animals and their habitats. The USFWS and the U.S. National Oceanic and Atmospheric Administration (NOAA) Fisheries Service administer the provisions of the ESA. The law requires Federal agencies, in consultation with the USFWS and/or the NOAA Fisheries Service, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. Sections 7 and 9 of the ESA allow "incidental" takes, but only with a permit. The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 et seq.) combined with Executive Order (EO) 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) protects more than 800 migratory bird species by making it illegal to take, possess, import, export, transport, sell, purchase, barter, or offer for sale any migratory bird, or the parts, nests, or eggs of such a bird; except as authorized under a valid permit. The MBTA defines "take" as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." EO 13186 directs agencies to take certain actions to further strengthen migratory bird conservation under the conventions under the MBTA, the Bald and Golden Eagle Protection Act (BGEPA), and other pertinent statutes. It requires the establishment of memoranda of understanding (MOUs) between the USFWS and other Federal agencies. Accordingly, BLM and USFWS implemented an MOU in 2010 to promote migratory bird conservation (BLM and USFWS 2010a).

The BGEPA (16 U.S.C. 668) as amended in 1972 prohibits any form of possession or take of bald or golden eagles, including any part, nest, or egg; unless allowed by permit. The BGEPA defines "take" as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The USFWS has issued a *Draft Eagle Conservation Plan Guidance Module 1: Wind Energy Development* that provides recommendations for the development of *Eagle Conservation Plans* to support issuance of eagle programmatic take permits for wind facilities, and describes a process by which wind energy developers can collect and analyze information that could lead to a programmatic permit to authorize unintentional take of eagles at wind energy facilities (USFWS 2011a).

BLM Manual 6840 authorizes each BLM State Director to designate and protect sensitive species on land managed by the BLM. Equal weight is given to species Federally listed as endangered, threatened, or candidate; designated critical habitat; species and critical habitat proposed for Federal listing; state listed species; and other sensitive species designated as such by BLM State Directors (BLM 2008, 2010a). This last category is generally used for species that occur on BLM-administered land for which the agency could, through its management, significantly affect the conservation status of a species.

Arizona Revised Statutes (ARS) Title 17 (Game and Fish) establishes that wildlife found in Arizona, except fish and bullfrogs impounded in private ponds or tanks or wildlife and birds reared or held in captivity under permit or license from the state wildlife commission, are property of the State of Arizona and may be taken at such times, in such places, in such manner, and with such devices as provided by law or rule of the commission. ARS Title 17 and associated rules regulate the lawful taking and handling of wildlife and establishes the Arizona Game and Fish Department (AGFD) as the agency responsible for managing wildlife populations in the state. Additionally, a Project-specific MOU between BLM and AGFD further describes the scope of collaboration and desired outcome for management of wildlife and habitats in the Project Area.

EO 13112 (Invasive Species) requires that Federal agencies prevent the introduction and spread of invasive species and to not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species.

The Plant Protection Act (Public Law 106-224) (2000) replaced many previous invasive plant species acts including the Federal Noxious Weed Act, the Plant Quarantine Act, the Federal Plant Pest Act and other related statutes and primarily applies to USDA, but authorizes the Animal and Plant Health Inspection Service to take both emergency and extraordinary actions to address incursions of noxious weeds that can be regulated on Federal lands.

The Noxious Weed Control and Eradication Act (Public Law 108-412) (2004) is an amendment to the Plant Protection Act and provides for the provision of funds through grants and agreements to weed management entities for the control and eradication of noxious weeds.

Arizona Native Plant Law (ANPL) (ARS § 3-901 to 3-916) is administered by the Arizona Department of Agriculture,who manages native plant resources and impacts to protected native plant species. ANPL-listed plants include four protection categories: Highly Safeguarded, Salvage Restricted (SR), Salvage Assessed, and Harvest Restricted. ANPL requires permitting, inventory, and the opportunity to salvage protected native plant species on state lands. Other landowners must file a notice of intent to clear land and destroy protected native plants.

3.5.1 Existing Conditions

3.5.1.1 Regional Overview

Ecoregion

The Project Area is located in the Mojave Desert ecoregion. Within this ecoregion, the Project Area is situated in a transitional zone between the warmer Sonoran Desert to the south and the higher and cooler Great Basin Desert to the north, in which shrub-dominated habitats begin to replace succulent-dominated ones (Lowe 1985). Arizona contains only the southeastern edge of the Mojave Desert, with the remainder lying in California, Nevada, and Utah. Located in the northwest corner of the state, Arizona's portion of the Mojave Desert covers about 3.2 million acres and is dominated by Mojave desert scrub, which has plants characteristic of both Great Basin desert scrub and the Sonoran desert scrub. Upper and lower Sonoran habitat types are found in warmer microclimates in the southern margin of the ecoregion, and it is often difficult to determine boundaries between Sonoran desert scrub and Mojave desert scrub because these habitat types share so many plant species. Five other habitat types are found more widely in the ecoregion, and are typically associated with mountain ranges and higher elevation basins.

Physiography

Major land features near the Project Area include the Hualapai Valley and Grand Wash Cliffs to the east, Cerbat Mountains to the south, Detrital Valley and Black Mountains to the west, the Sacramento Valley and Mohave Mountains farther to the southwest, and Lake Mead to the north (USGS 1983).

The Colorado and Virgin rivers are the primary river systems in the region. The Colorado River has been modified over most of its length with the creation of Lakes Mead, Mohave, and Havasu. Historically, the Colorado River—with its tributaries, wetlands, flood plains, and riparian forests—provided habitat for a diverse array of wildlife species and native fish in this desert ecosystem. While the Colorado River has been dammed and the original river habitat has been impacted, there is considerable habitat created along the river corridor. This is in addition to the Havasu National Wildlife Refuge and Bill Williams National Wildlife Refuge, and lower Colorado River system.

Elevation in the Project Area is between about 1,920 feet in the northwestern corner and 3,836 feet near the eastern border of the Project Area (Township 29 North, Range 19 West, Section 32) (USGS 1983). The terrain is highly variable throughout the Project Area. The northwest sector is hilly with low mountains; the eastern part is hilly; and the central section is generally flat.

Precipitation is scarce in the region and Project Area. Precipitation ranges from about 8 inches to 10 inches per year. Seasonally, slightly more precipitation falls in winter than during the summer monsoon. Biological resources are influenced greatly by the cyclical El Niño-La Niña climate events. El Niño years provide higher than average precipitation and more resources for plants and animals; whereas, La Niña years provide lower than average precipitation and resources for plants and animals.

The broad ecological setting of the Project Area is influenced by its geographic relationships to the ecoregion and physiographic province. This allows the Project Area to share plants and animals that are characteristic of parts of the Great Basin, Mojave Desert, and Sonoran Desert. The various microclimates created by local differences in soil, topography, and available water, characterize the habitats and influence the local diversity, distribution, and abundance of plants and animals in the Project Area. The details of these biological resources are described further in the sections that follow.

3.5.1.2 Vegetation

Data Collection Methods

The narrative of vegetation resources is based on field surveys, mapped landcover from the Southwest Regional Gap Analysis Project (Southwest ReGAP) (USGS 2004), soil survey ecological site data, and other published information (Brown 1994). The plant associations that are described use the conventional naming of Southwest ReGAP, and the scientific names of plants follow the taxonomy of the U.S. Department of Agriculture (USDA) PLANTS database (USDA, NRCS 2010).

Statistical analyses were conducted to assess the baseline conditions among the alternative Project configurations. The acreages of the vegetation and landcover types were compared using an analysis of variance for correlated data ($\rho = 0.05$). Although the acreages vary somewhat among the four action alternatives, this comparison indicated that there is no difference in the baseline composition of the vegetation and landcover types for the Project Area defined for each alternative.

The landcover and vegetation classes that represent the different biotic communities associated with the Project are described below. The distribution of these areas within the Project Area is shown in the vegetation map for the different alternatives (Map 3-6), and acreages of the vegetation and landcover types are shown in Table 3-8 according to the four action alternatives.

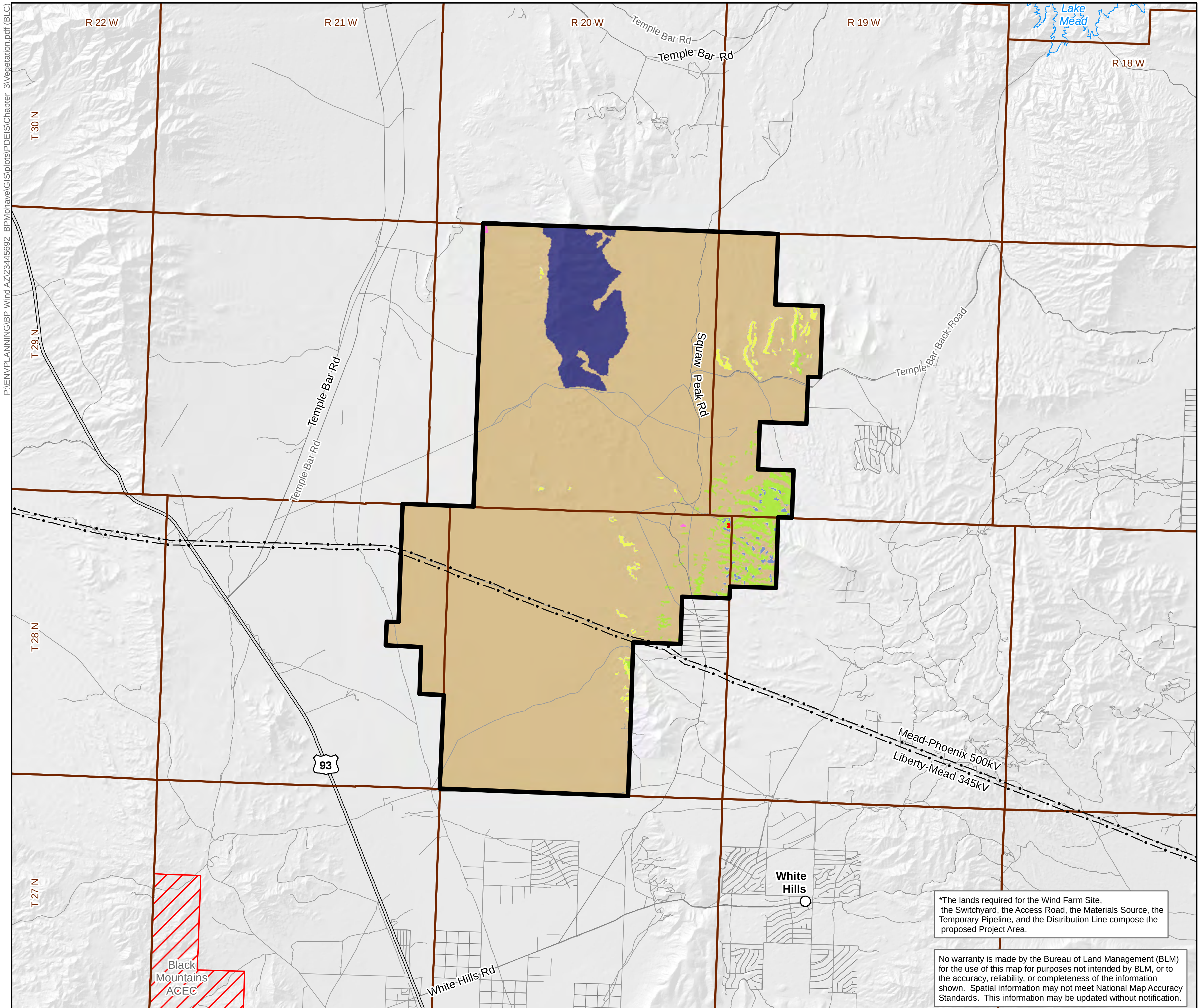
3.5.1.3 Land Cover and Plant Communities

Sonora-Mojave Creosotebush-White Bursage Desert Scrub. This vegetation type forms in broad valleys, lower bajadas, plains, and low hills in the Mojave and lower Sonoran deserts (Natureserve 2009). It is the most common type of vegetation in the Project Area. Acreages of this vegetation are presented in Table 3-8 according to the Project action alternatives.

Table 3-8 Acres of Vegetation or Landcover by Project Action Alternatives [1]

Vegetation or Landcover Class	Alternative A	Alternative B	Alternative C	Alternative E
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	42,566	32,482	33,289	36,397
North American Warm Desert Volcanic Rockland	2,843	1,326	1,396	329
Mojave Mid-Elevation Mixed Desert Scrub	1,225	740	477	1,173
North American Warm Desert Bedrock Cliff and Outcrop	328	66	66	111
Inter-Mountain Basins Semi-Desert Shrub Steppe	96	68	36	96
Sonora-Mojave Mixed Salt Desert Scrub	1	1	1	3
Inter-Mountain Basins Big Sagebrush Shrubland	1	1	1	1
Total Acres	**47,060**	**34,684**	**35,266**	**38,110**

SOURCE: Southwest ReGAP
[1]Acreages are based on Southwest ReGAP data; actual ground conditions may vary (not ground-truthed).



Map 3-6
Vegetation Communities

Mohave County Wind Farm Project

Legend

Wind Farm Site*

Bureau of Land Management Area of Critical Environmental Concern (ACEC)

Vegetation Communities

Inter-Mountain Basins Big Sagebrush Shrubland

Inter-Mountain Basins Semi-Desert Shrub Steppe

Mojave Mid-Elevation Mixed Desert Scrub

North American Warm Desert Bedrock Cliff and Outcrop

North American Warm Desert Volcanic Rockland

Sonora-Mojave Creosotebush-White Bursage Desert Scrub

Sonora-Mojave Mixed Salt Desert Scrub

General Features

Community

Existing Transmission Line

U.S. Highway

Road

Township and Range Boundary

Lake

Source:
Project Area Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009
Vegetation Communities: Southwest Regional Gap Analysis Project (SWReGAP), USGS 2004

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This desert scrub association is characterized by a sparse to moderately dense layer (2-50 percent cover) of small-leaved, broad-leaved, and drought-adapted shrubs (Natureserve 2009). Creosotebush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) are the dominant species, but many different shrubs, dwarf-shrubs, and cacti may form sparse understories (Brown 1994). Within the Project Area, this vegetation type exhibits a great deal of variation in its secondary species, which change with elevation, soil texture, and available precipitation. These can include banana yucca (*Yucca baccata*), rayless goldenhead (*Acamptopappus sphaerocephalus*), white burrobrush (*Hymenoclea salsola*), big galleta (*Pleuraphis rigida*), black grama (*Bouteloua eriopoda*), slim tridens (*Tridens muticus*), bush muhly (*Muhlenbergia porteri*), flat-top buckwheat (*Eriogonum fasciculatum*), Joshua tree (*Yucca brevifolia*), Nevada Mormon tea (*Ephedra nevadensis*), blackbrush (*Coleogyne ramosissima*), and white brittlebush (*Encelia farinosa*) (USDA, NRCS 2005). Catclaw acacia (*Acacia greggii*) usually occurs as a co-dominant species near dry washes (USDA, NRCS 2005). Sonora-Mojave creosotebush-white bursage desert scrub occurs extensively throughout the Project Area, except in mountainous and hilly terrain that occurs in the north-central and extreme eastern regions.

Mojave Mid-Elevation Mixed Desert Scrub. This vegetation type grows in a transition zone between sagebrush vegetation and piñon-juniper woodlands (Natureserve 2009) in the Mojave Desert, and the plant composition is quite variable. This is the second most common vegetation type in the region and all stands of this plant community are located in the White Hills, in the eastern portion of the Wind Farm Site, irrespective of the action alternative boundaries.

Co-dominant and diagnostic species include gray horsebrush (*Grayia spinosa*), desert thorn (*Lycium* spp.), spiny menodora (*Menodora spinescens*), beargrass (*Nolina* spp.), buckhorn cholla (*Cylindropuntia acanthocarpa*), bladder sage (*Salazaria mexicana*), Parish's goldeneye (*Viguiera parishii*), Mohave yucca (*Yucca schidigera*), banana yucca, flat-top buckwheat, blackbrush, or Nevada Mormon tea (Natureserve 2009). Less common are stands with scattered Joshua trees or salt bush (*Atriplex* spp.). Juniper (*Juniperus* sp.) occurs sporadically in parts of this vegetation type in the White Hills.

North American Warm Desert Volcanic Rockland. This landcover type is restricted to barren and sparsely vegetated (<10 percent plant cover) volcanic substrates in the warm deserts of North America (Natureserve 2009). The vegetation varies according to local environmental conditions. Warm desert volcanic rockland occurs in the White Hills from Squaw Peak northward, in the north-central portion within the action alternatives boundaries.

North American Warm Desert Bedrock Cliff and Outcrop. This landcover type includes barren and sparsely vegetated landscapes (generally <10 percent plant cover) on steep cliff faces, narrow canyons, and smaller rock outcrops (Natureserve 2009). This also includes unstable scree and talus slopes that often form below cliff faces. Sites with this landcover in the Project Area include places scattered among various ridgelines and mountain formations. There typically is no defined vegetation type, but species include rock-dwelling plants and may include ocotillo (*Fouquieria splendens*), beargrass, and other desert species, especially succulents (Natureserve 2009). This landcover type occurs in the White Hills, in the northwestern and south-central portion within the action alternatives boundaries.

Inter-Mountain Basins Semi-Desert Shrub Steppe. This vegetation type occurs throughout the intermountain western United States, typically at lower elevations on alluvial fans and flats with moderate to deep soils (Natureserve 2009). It grows on in small isolated patches in the White Hills, in the eastern portion within the action alternatives boundaries—all on BLM-administered land.

This semi-arid shrub-steppe is typically dominated by grasses (>25 percent cover) and has an open to moderately dense overstory of shrubs. Common grasses include blue grama (*Bouteloua gracilis*), inland saltgrass (*Distichlis spicata*), Sandburg bluegrass (*Poa secunda*), tall dropseed (*Sporobolus airoides*), needle and thread grass *(Hesperostipa comata*), and James' galleta (*Pleuraphis jamesii*) (Natureserve 2009). Characteristic shrubs include four-wing saltbush (*Atriplex canescens)*, big sagebrush (*Artemisia tridentata*), Greene's rabbitbrush (*Chrysothamnus greenei*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), Mormon tea (*Ephedra* spp.), broom snakeweed (*Gutierrezia sarothrae*), and winterfat (*Krascheninnikovia lanata*).

Sonora-Mojave Mixed Salt Desert Scrub. Sonora-Mojave mixed salt desert scrub occurs in arid and semiarid environments within the Southwest that have fine, loamy soils that are saline or strongly alkaline (NatureServe 2009). This vegetation community usually has a sparse ground cover that ranges from 2 to 40 percent and includes many plant species with either drought-deciduous or succulent leaves (NatureServe 2009). The dominant species include four-wing saltbush, allscale (*A. polycarpa*), shadscale (*A. confertifolia*), desert holly (*A. hymenelytra*), and desert seepweed (*Suaeda suffrutescens*), which are all tolerant of high-salinity soils and low moisture (NatureServe 2009). This landcover type occurs as two isolated patches in the White Hills, in the eastern portion of the alternative Project boundaries.

Inter-Mountain Basins Montane Sagebrush Shrubland. This vegetation type includes sagebrush communities occurring in foothills and mountains across the western United States (Natureserve 2009). It occurs where the climate is cool, semi-arid to sub-humid, and the soils are deep and stony. It occurs in the White Hills in the eastern portion within the action alternatives boundaries.

This vegetation type includes a variety of plants that vary according to local and regional environments. Big sagebrush is typically the most common species, but is often intermixed with other sagebrush species. Other common species include antelope bitterbrush (*Purshia tridentata*), snowberry, serviceberry (*Amelanchier* spp.), rubber rabbitbrush (*Ericameria nauseosa*), wax currant (*Ribes cereum*), and yellow rabbitbrush. Most stands have an abundant perennial herbaceous layer (25 percent to 50 percent cover), often dominated by various grass species. Fire may be important for maintaining the cover and composition of plant species.

3.5.1.4 Riparian Areas and Desert Washes

Numerous dry desert washes occur within the Project Area. All of the washes identified during jurisdictional delineation surveys were categorized as ephemeral drainages in the Project Area; no perennial or intermittent streams, wetlands, or other surface water occurred in the Project Area (EcoPlan 2011). The washes were typically devoid of vegetation within the channel (EcoPlan 2011). Channel substrates were primarily composed of sand and gravel, and no hydrophytic vegetation or hydric soils were observed along any of the washes identified within the Project Area (EcoPlan 2011).

Proper Functioning Condition

An assessment of proper functioning condition (PFC) is not applicable to the Project. PFC is a measure of wetland health. BLM defines wetlands as marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas. Only ephemeral drainages are present in the Project Area, and PFC assessment is not relevant.

3.5.1.5 Noxious and Invasive Weeds

Invasive plants are those species that have been introduced into an environment where they did not evolve. As a result, they usually have no natural enemies to limit their reproduction and spread. Noxious weeds are legally designated by a Federal, state, or county government as plants that are injurious to public health, agriculture, recreation, wildlife or property. In the Mojave Desert, invasions of these species can degrade food and habitat resources for native wildlife and can alter the wildland fire regime, which can lead to more frequent and intense fires that can destroy the non-fire adapted native plants and permanently alter the vegetation community and wildlife habitats in an area that burns (Brooks et al. 2004).

For this Project, noxious weeds are those invasive plant species that are defined by law by the State of Arizona and Federal government. Noxious weeds are managed according to BLM policy and pursuant to the following authorities (described in detail above): EO 13112 (Invasive Species), The Plant Protection Act (Public Law 106-224) (2000), The Noxious Weed Control and Eradication Act (Public Law 108-412) (2004). Under state law, noxious weeds include plants, plant parts, or seeds of non-native and invasive species that are grouped into three classes. Prohibited noxious weeds include species that are prohibited from entry into the state. Regulated noxious weeds include species, that if found within the state, may be controlled or quarantined to prevent further infestation or contamination. Restricted noxious weeds include species, that if found within the state, shall be quarantined to prevent further infestation or contamination.

BLM's preferred practice of invasive plant and noxious weed control is to prevent infestation or to treat small infestations prior to their spread throughout a larger area (BLM 2010e). BLM uses an integrated approach to manage infestations, with methods that include combinations of biological, mechanical, and chemical control. The goal is to use those control methods that have the least negative impact on the environment and that are most effective at controlling a particular infestation. Chemical pesticides are used if they are the most effective control and after considering other control methods (BLM 2007). Also BLM develops partnerships to better control invasive plants and noxious weeds on a larger regional basis to aid in preventing infestations on BLM administered lands.

No specific noxious weed surveys have been conducted within the Project Area. Incidental observations during baseline biological surveys indicated infestations of non-native plant species that included Sahara mustard (*Brassica tournefortii*), red brome (*Bromus rubens*), and cheat grass (*Bromus tectorum*) within the Project Area. Records of invasive plants available from the Southwest Exotic Plant Information Clearinghouse (SEPIC) (2007) indicate that these three species along with Mediterranean grass (*Schismus barbatus*), Russian thistle (*Salsola tragus*), and red-stem filaree (*Erodium cicutarium*) are common, with numerous records in the valleys surrounding the Project Area. Salt cedar (Tamarix sp.), Malta star thistle (*Centaurea melitensis),* and Bermuda grass (*Cynodon dactylon*) have been recorded along or near the southern shore of Lake Mead (NPS 2010c). Malta star thistle also occurs within the right-of-way along Highway 93 in the Project Area vicinity, and has the potential to be spread to and within the Project Area. None of these species are listed as noxious weeds by the State of Arizona or the Federal government. However, these non-native invasive plants have the effect of damaging natural communities by increasing the frequency of fire or degrading habitat or food resources for native animal species such as the desert tortoise (Brooks et al. 2004). Salt cedar can nearly completely replace native vegetation by outcompeting native shrubs for available water and by increasing soil salinity.

3.5.1.6 Fire

Desert vegetation associations in the Mojave Desert ecoregion have had a low historical fire frequency. Under natural conditions, the dry climate limits the woody biomass, which is not favorable for fueling natural fires, and the discontinuous structure of the vegetation is poorly suited to spreading any ignitions (BLM 2004). As a result, most perennial plants of the Mojave Desert have not adapted to fire and can be killed or damaged when burned (Brooks et al. 2004). The invasion of exotic annual grasses into deserts of the Southwest has changed the structure of the vegetation, allowing for more frequent fires that burn extremely hot and fast through an area. Once burned, native desert vegetation is often replaced or dominated by exotic annual grasses that are more competitive in burned areas.

Fuel Types

Fuels in the Mojave Desert consist of desert shrubs intermixed with grasses, annuals, and perennials. Fuels depend on heavy winter and early spring precipitation for growth of grasses and herbaceous annuals and perennials, which also may persist to the next year's growing season (BLM 2004). Above average moisture usually results in an abundance of annual fuels, but there is little yearly change in fuels from desert shrubs. Fuel types in the Project Area and surrounding region are represented by the National Fire Danger Rating Fuel Model A and Northern Forest Fire Laboratory Fuel Model 1 (BLM 2004).

Wildland Fire Management

Wildland fire is not desired in natural ecosystems in the Mojave Desert ecoregion. Fire suppression is the preferred method of management (BLM 2004). Prescribed fire would not be used normally, because native vegetation is primarily maladapted to fire; however, pile burning may be used in conjunction with mechanical treatment (including manual) where appropriate (BLM 2004). Mechanical thinning, control of invasive plants by various methods, or removal of vegetation could be used to reduce the potential of wildland fire in an area (BLM 2004). Post-fire restoration and rehabilitation would be implemented according to the Colorado River District Fire Management Plan (BLM 2011d).

Fire Regimes

Desert shrublands are the predominant type of vegetation in and near the Project Area. These shrublands are categorized as Fire Regime IV (35 to 100-plus-year frequency, stand replacement severity) and are currently in Condition Class 2 (BLM 2004). Condition Class 2 is defined as a fire regime moderately altered from historic range, and the risk of key ecosystem component loss is moderate. Condition Class 2 also has departed from historical fire frequency by more than one return interval, and there is a moderate change to fire size, frequency, intensity, and/or landscape pattern and to vegetation. These categories have been instituted in the region because of the invasion of fire-prone, introduced annual grasses and the resulting increase in fire occurrence (BLM 2004). Recent large wildland fires in parts of the Mojave Desert ecoregion have reduced the presence of native plant species (BLM 2004).

Fire History and Data

The historical fire frequency in and near the Project Area has had a return rate of 35 to 100 or more years. Between 1980 and 2003, 251 fires started on public lands north of Interstate 40 (I-40) that are administered by the BLM KFO (BLM 2004). These fires burned an estimated 72,053 acres (BLM 2004). Most of the area burned was in the Mojave Desert shrublands. The largest fire burned 21,276 acres and the average fire size was 277 acres. There have been 39 large fires of 100 or more acres during this period (BLM 2004). No fire history data are available specifically for the Wind Farm Site irrespective of the action alternative boundaries.

3.5.2 <u>Wildlife</u>

3.5.2.1 Data Collection Methods

The wildlife section describes wildlife resources that may be found in the proposed Project Area and vicinity. The sources of information include published literature, AGFD Heritage Database Management System (HDMS) data (AGFD 2010b), and AGFD unpublished species abstracts. In addition, a two-year baseline field study was conducted in a previously proposed Project Area, between April 2007 and June 2009, and included surveys of nesting raptors; avian use, including passerines and migratory birds; and bat species that involved acoustical monitoring counts, mine exit surveys, and mist net surveys (Goode and Thompson 2009). These wildlife surveys included some effort on the current footprint and some off-site to the east. As a result of significant changes to the proposed Project boundary, a second round of baseline wildlife studies was conducted between September 2010 and July 2011 within the current footprints of the Project action alternatives. The detailed methods and results of the field studies are archived in the administrative record for the Project, and the results are summarized in the following sections.

3.5.2.2 Mammals

Boykin et al. (2007) used improved Southwest ReGAP distribution models to predict the distribution of vertebrates in the Mojave Desert. Based on these distribution models, the authors' data indicate that 46 to 58 mammalian species may occur in the Project Area or in the nearby surrounding vicinity (Boykin et al. 2007). This region is moderately diverse; desert environments in the Southwest can have upwards of 70 to 80 species of mammals in similar to slightly larger areas (Hoffmeister 1986, Hall 1947). Ten terrestrial species of mammals were observed supplemental to baseline biological surveys for birds and bats (Thompson et al. 2010) in the Project Area (Table 3-9). The mule deer (*Odocoileus hemionus*) was the most commonly observed mammal species. Specific data regarding the overall abundance, density, and distribution of these species were not available.

Table 3-9 Incidental Mammal Observations in the Project Area

Common Name	Scientific Name
White-tailed antelope ground squirrel	*Ammospermophilus leucurus*
Badger	*Taxidea taxus*
Black-tailed jackrabbit	*Lepus californicus*
Coyote	*Canis latrans*
Common gray fox	*Urocyon cinereoargenteus*
Kangaroo rat	*Dipodomys* spp.
Kit fox	*Vulpes macrotis*
Mule deer	*Odocoileus hemionus*
Pocket mouse	*Perognathus spp.*
Pronghorn	*Antilocapra americana*

SOURCE: Thompson et al. 2011

Bats

Bat species potentially occurring in the area characteristically include those that roost in rock and boulder crevices, mines, caves, and manmade structures. These species forage for insects, normally in sparse desert habitats, xeri-riparian areas along drainages and washes, or at higher altitudes above the desert floor. Tree roosting and forest-dwelling bat species are expected to be uncommon seasonal migrants or absent altogether from the proposed Project Area.

Between 2007 and 2011, data on the distribution and seasonal use patterns of bats in the Project Area were gathered by a variety of methods including bat acoustic monitoring at ground-level and elevated stations, abandoned mine surveys, and bat mist-net surveys. Bat acoustic monitoring was conducted in both the prior layout and the proposed layout, abandoned mine surveys and exit counts were performed in the prior layout, and mist netting was conducted in the prior layout. To collect information on year-round habitat use by bat populations at the proposed Project Area, acoustic monitoring stations were established at fixed locations using Anabat II bat detectors at both ground-level and elevated stations. Sampling was conducted monthly from April 2007 to August 2008 within a previous configuration of the Project boundary at ground-based stations. Following major changes to the Project boundary, acoustical monitoring surveys were repeated from September 8 through November 4, 2010 and February 23 through July 15, 2011 to sample bat activity at new sites in the current Project Area that were not part of the original Project Area. This period of sampling utilized both ground-level and elevated sampling stations. During the 2009 acoustic monitoring period two AR125© Binary Acoustic Technology (BAT; Tucson, Arizona) ultrasonic detectors were rotated among Anabat ground stations on a weekly basis to aid in identifying specific bat species in the Project Area (Thompson et al. 2011). Acoustic data recorded with BAT detectors are full spectrum, which differs from zero-crossing data by retaining more of the information in each echolocation pulse, including harmonics that can be useful for species identification (Thompson et al. 2011).

During the initial surveys from April 2007 to August 2008, mist net surveys were conducted at water sources to further estimate use patterns within the previous configuration of the Project boundary. Also, mine shaft surveys were conducted during that period to document use of the area by breeding and hibernating bats. Exit counts of mine shafts were conducted to determine if large roosts exist in abandoned mines near the previous configuration of the Project boundary (Solick et al. 2009). The closest of these is about 1.7 miles (2.7 km) southeast of the southeastern corner of the action alternatives boundaries. The remaining mines are about 3.3 to 8.4 miles east of the eastern action alternatives boundaries (Map 3-7).

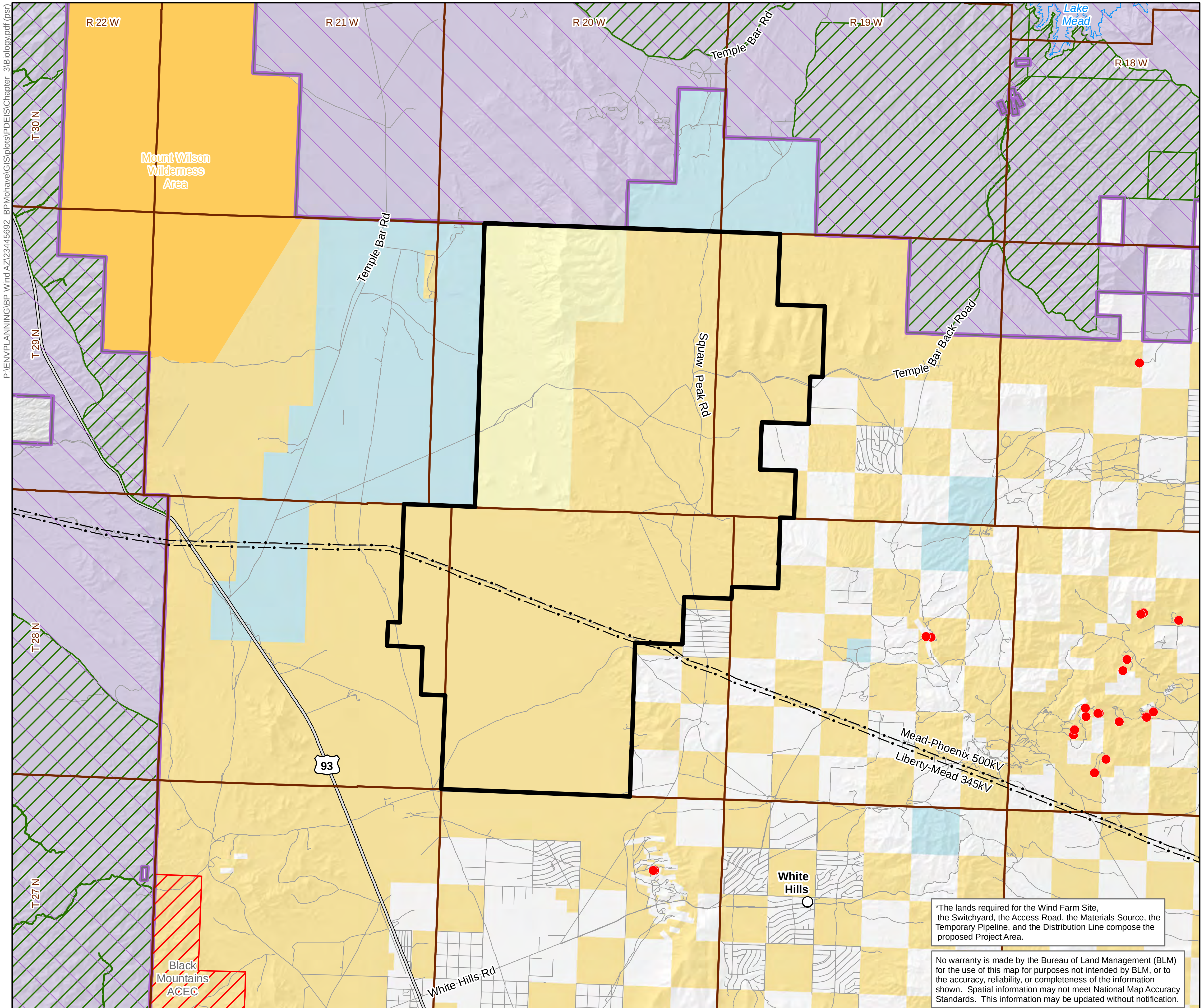
The number of detectors out at any given time varied between two and ten. At the 14 stations, Anabat units recorded 18,313 bat passes during 2,632 detector-nights. Averaging bat passes per detector-night across all locations resulted in a mean of 7.73 bat passes per detector-night, with the average bat activity being 8.36 bat passes per detector-night at ground stations and 6.14 bat passes per detector-night at raised stations (Thompson et al. 2011). Unlike activity patterns at most other proposed wind developments where bat activity rates generally peak in the fall, bat activity levels in the Project Area peaked in the spring (late April and early May) of each year of study (Thompson et al. 2011).

Low frequency (less than 35 kilohertz [kHz] echolocation passes accounted for the majority (92.6 percent) of all bat passes. High-frequency (greater than 35 kHz; e.g., *Myotis* species) passes accounted for only 7.4 percent (Thompson et al. 2011). The Mexican free-tailed bat (*Tadarida brasiliensis*) accounted for most of the bat activity at the acoustic sampling stations (80.6 percent of all activity), followed by the California myotis (*Myotis californicus*) (7.8 percent of activity), canyon bat (*Parastrellus hesperus*) (4.7 percent of activity), and the Yuma myotis (*Myotis yumanensis*) (2.7 percent of the activity) (Tetra Tech 2012b). The big brown bat (*Eptesicus fuscus*) was the most active bat at a single location in 2007, but accounted for little activity at the other sampling stations (2.4 percent of the overall activity). The remaining species accounted for less than 1 percent of activity at the other sampling stations within the Project Area and the surrounding sampling area. Brazilian free-tailed bat accounted for 99 percent of the activity at the high detectors (Tetra Tech 2012b).

A total of 15 species were recorded during the sampling periods (Table 3-10). Nine species were captured during mist net surveys, of which the canyon bat, California myotis, and Townsend's big-eared bat (*Corynorhinus townsendii*) were most common among captured species (Solick et al. 2009). The hoary bat (*Lasiurus cinereus*) and the western red bat (*Lasiurus blossevilli*) were the only tree bats recorded in the Project Area. Another tree bat, the silver-haired bat (*Lasionycteris noctivagans*) was recorded east of the Project Area. The other captured species are presented in Table 3-10 (Solick et al. 2009). Six of these that were sampled during the surveys have been recorded as fatalities at other wind-energy facilities (Table 3-10). The western mastiff bat, big free-tailed bat, Mexican free-tailed bat, and Allen's big-eared bat have also raised concern, because these species are fast, high-altitude fliers that could fly in the rotor sweep area of wind turbines.

Map 3-7
Bat Mine Roosts

Mohave County Wind Farm Project



Legend

- Wind Farm Site*
- Occupied Mine Roost
- National Park Service Lake Mead National Recreational Area Boundary
- Bureau of Land Management Area of Critical Environmental Concern (ACEC)
- National Park Service Proposed Wilderness

Surface Management

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- StateTrust Land
- Private Land
- Bureau of Land Management Wilderness Area

General Features

- Community
- Existing Transmission Line
- U.S. Highway
- Road
- Township and Range Boundary
- Lake

Source:
Project Site Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009
Bat Studies for Mohave County Wind Resource Area Interim Report 2009

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Table 3-10 Characteristics of Bats Found or Likely to Occur in the Project Area

Call Frequency Groupings	ANABAT Type Groupings	Species	Sensitive Species	Long Distance Migrant	Fatality at Other Wind Facilities	Found in Project Surveys	Detection Method
High-Frequency (≥35 kHz)	50 kHz	California myotis *Myotis californicus*	--------	No	No	Yes	Mist Net Acoustic
		Yuma myotis *Myotis yumanensis*	--------	No	No	Yes	Mist Net Acoustic
	40 kHz	Western small-footed myotis *Myotis ciliolabrum*	--------	No	No	Yes	Acoustic
		Canyon bat *Parastrellus hesperus*	--------	No	Yes	Yes	Mist Net Acoustic
	Identified to species when possible	Western red bat *Lasiurus blossevillii*	Tier 1C SGCN	Yes	Yes	Yes	Acoustic
Low-Frequency (<35 kHz)	30 kHz	Fringed myotis *Myotis thysanodes*	--------	No	No	Yes	Acoustic
		Pallid bat *Antrozous pallidus*	Tier 1C SGCN	No	No	Yes	Mist Net Acoustic
		Big brown bat *Eptesicus fuscus*	--------	No	Yes	Yes	Mist Net Acoustic
		Silver-haired bat *Lasionycteris noctivagans*	Tier 1C SGCN	Yes	Yes	Yes	Acoustic
		Mexican free-tailed bat *Tadarida brasiliensis*	Tier 1B SGCN	Yes	Yes	Yes	Mist Net Acoustic
		Townsend's big-eared bat *Corynorhinus townsendii*	Tier 1C SGCN, BLM	No	No	Yes	Mist Net Acoustic
	Identified to species when possible	Hoary bat *Lasiurus cinereus*	Tier 1C SGCN	Yes	Yes	Yes	Mist Net Acoustic
		Allen's big-eared bat *Idionycteris phyllotis*	BLM	No	No	Yes	Mist Net Acoustic
		Big free-tailed bat *Nyctinomops macrotis*	Tier 1C SGCN	Yes	Yes	Yes	Acoustic
		Western mastiff bat *Eumops perotis*	Tier 1B SGCN, BLM	No	No	Yes	Acoustic

Note: kHz = kilohertz
SGCN = Species of Greatest Conservation Need
SOURCE: Solick et al. 2009, Thompson et al. 2011, AGFD 2010b, BLM 2010a.

Species richness varied across sample locations, and no single sampling location recorded the full suite of bat species recorded in the Study Area (Tetra Tech 2012b). Species richness was greater outside of the Project Area (7.5 species), while species richness within the Project Area averaged 6.8 species (Tetra Tech 2012b).

Activity rates also varied spatially across the Project Area (Tetra Tech 2012b). The Project Area is not located close to any large, known bat colonies. Numerous mines are located in the mountains surrounding the Project Area, some of which were occupied by bats during earlier surveys (Solick et al. 2009), but no active mines are known within the most current Project boundary (Thompson et al. 2011). The Project Area lacks large tracts of forest cover, unlike the high-mortality sites in the eastern US, but does contain topographic features that may be utilized by roosting bats, primarily cliffs that contain cracks/crevices for roosting (Thompson et al. 2011). The mountain ranges are generally small and not well connected within the Project Area and would not likely serve as a funnel for migrating bats; however, the highest bat activity rates recorded during surveys within the Project Area were along the western slope of the mountains north of Squaw Peak in the northwestern portion of the Project Area (Thompson et al. 2011). Bat activity at Station MC2g in that area accounted for a quarter (25.1 percent) of the calls recorded during acoustical monitoring surveys (Thompson et al. 2011). The reason for the elevated activity levels at Station MC2g is unknown. Moderate to low bat activity was recorded at the remaining stations, with the stations in the northern half of the Project Area usually having more activity than those in the southern half.

The ground units at three of four monitoring stations recorded more passes than the raised units. Bat activity at Station WTT in the southeastern sector of the Project Area was the exception, where activity at the raised station was slightly greater than at the ground station. The pattern suggests higher bat activity at heights near the bottom or below the proposed rotor swept area (Thompson et al. 2011).

The mean number of bat detections per night was compared to existing data from two other wind facilities in the greater region where both bat activity and mortality rates have been measured. Overall bat activity recorded by ground detectors within the Project Area was 8.36 ± 1.04 bat passes per detector-night. This rate is much higher than the rates observed at the Dillon wind facility in southern California (<1 bat pass/detector night for all seasons individually) (Chatfield et al. 2009 in Thompson et al. 2011), and similar to the one observed at the Dry Lake facility in Arizona (8.83 bat passes/detector night). Fatality rates for bats at those two sites were 2.17 and 4.29 fatalities/megawatt (MW)/year, respectively. Based solely on this rate, expected fatality rates from the proposed Project may be expected to be closer to 4.29 than to 2.17 (Thompson et al. 2011). However, while overall mean activity rates were similar between the Project Area and Dry Lake, the timing of the activity differed in potentially important ways, with peak bat activity occurring in the spring within the Project Area and during the fall at Dry Lake (Thompson et al. 2011). Compared to the Mohave County Wind Farm Project Area, Dry Lake supports a larger number of habitats, including habitats that are more likely to support certain guilds of bats such as migratory tree or tree-cavity roosting bats, which have experienced high fatality rates at wind energy facilities. Tree or tree-cavity roosting bats accounted for less than 1.0 percent of activity in the Mohave County Wind Farm Project Area (TetraTech 2012b). The exposure of migratory tree-roosting bats to collision at the Project would likely be low given the low frequency of use and the lack of suitable roosting habitat.

Big Game

Four big game mammal species may occur within or near the Project Area: pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), desert bighorn sheep (*Ovis canadensis*), and mountain lions (*Puma concolor*). Mule deer and pronghorn were documented in the Project Area during baseline wildlife surveys.

Pronghorn – In Arizona, pronghorn are most common in the northern grasslands and shrub-steppes. They also inhabit high elevation meadows between forested areas; and scattered herds have repopulated the grasslands of southeastern Arizona. The endangered Sonoran pronghorn is restricted to the extreme desert lands of southwestern Arizona and northern Sonora, Mexico. The statewide population of pronghorn is estimated at 7,800 post-hunt adults (AGFD 2009a).

Pronghorn habitat consists of grass-shrub valleys and grasslands with low topographic relief. Based on several studies conducted over the years, the species prefers habitat with: (1) ground cover averaging 50 percent living vegetation and 50 percent nonliving vegetation; (2) a vegetation composition of 40 to 60 percent grass, 10 to 30 percent forbs, and 5 to 20 percent browse; (3) succulent plants, available in spring and wet summers; and (4) vegetation averaging 38 centimeters (15 inches) in height (AGFD 2002a). Habitat for the species occurs in the valleys in and around the Project Area. There was a single observation of two individuals of this species during baseline wildlife surveys for bats and birds (Thompson et al. 2011).

Mule Deer – Mule deer are the most abundant big game animal in Arizona, with the statewide population estimated at 120,000 post-hunt adults. Populations can be found in most areas of the state, from sparsely vegetated deserts upward into high, forested mountains. Mule deer move seasonally between various vegetation zones. Summer ranges include forest habitats and other upland vegetation types at higher elevations, and winter ranges usually incorporate the lower desert lowlands. Mule deer occupy almost all types of habitat within their range, yet they seem to prefer arid, open areas and rocky hillsides. Bitterbrush and sagebrush occur most commonly among habitats used by mule deer. Mature bucks tend to prefer rocky ridges for bedding ground, while does and fawns are more likely to bed down in the open (AGFD 2009a). Habitat for mule deer occurs throughout the Project Area. There were 17 observations of this species with a total of 34 individuals that were observed during baseline wildlife surveys for bats and birds (Thompson et al. 2011).

Bighorn Sheep – Bighorn sheep are diurnal animals and are usually found in small bands of 4 to 10 individuals, although herds of 50 or more are sometimes seen. Native grasses are important in the bighorn sheep's diet, although the animals also feed heavily on jojoba (*Simmondsia chinensis*) and other woody plants. Preferred forage plants vary with habitat quality, locality, and local availability. Mountain lions are the principal predator, although golden eagles (*Aquila chrysaetos*) and bobcats (*Lynx rufus*) have been detected taking lambs (AGFD 2009a). Desert bighorn sheep require access to freestanding water during the summer months; during periods of drought, bighorn sheep may need water throughout the year. Individuals sometimes obtain needed water by consuming pincushion (*Mammillaria* and *Escobaria* spp.), barrel (*Ferocactus* and *Echinocactus* spp.), or saguaro (*Carnegiea gigantea*) cacti. Arizona's bighorn sheep population, consisting of both Rocky Mountain and desert races, is currently estimated at about 6,000 animals (AGFD 2009a).

Desert bighorn sheep are located in mountain ranges throughout the Southwest. Typical desert bighorn sheep terrain is rough, rocky, and steep, and is broken up by canyons and washes, which affords them some advantage in avoiding predators. Places with bighorn sheep herds nearest to the Project Area include the cliffs above Lake Mead and the Black Mountains, between 10 miles northwest to 16 miles west of the Project Area. BLM has established a bighorn sheep Area of Critical Environmental Concern in the Black Mountains west of the Project Area. Bighorn sheep could move between these two areas along cliffs and mountainous uplands along the Colorado River. It is unlikely that bighorn sheep would occur in the Project Area. Any occurrences would be limited to rare migrants moving between the higher mountainous areas in the region.

Mountain Lion – In Arizona, mountain lions are absent only from the extremely arid southwest and those areas heavily impacted by human development. In general, the distribution of mountain lions in the state corresponds with the distribution of the animal's major prey species—mule and white-tailed deer. However, they will feed on carrion and prey on other ungulates, rodents, reptiles, and birds (AGFD 2009a).The statewide population is estimated at 2,500 mountain lions (AGFD 2009a).

Mountain lion habitat ranges from desert, chaparral, and badlands to subalpine mountains. Two of the most important components of lion habitat are a source of prey and cover for hunting. Lions are generally most abundant in areas where mule deer are plentiful. The entire project area is potential mountain lion habitat. No mountain lions were observed during baseline wildlife surveys for bats and birds (Thompson et al. 2011).

Wild Burros

There are three wild horse and burro Herd Management Areas (HMAs) within the BLM Kingman Field Office (BLM 1995). The nearest HMA is the Black Hills Management Area, approximately 20 miles northwest and west of the Project Area. No burros have been seen in the Project Area (Thompson et al. 2011).

3.5.2.3 Birds

To assess the abundance and location of birds within the Project Area, an avian abundance survey was conducted. Initial surveys were conducted between April 2007 and November 2008 using a fixed point count methodology. After the Project boundary changed substantially, surveys were repeated in parts of the new Project Area that were not surveyed previously; this second set of surveys were conducted from September 3, 2010 through May 30, 2011 using the same methods.

Thirty-five species were detected during fixed point count surveys. An additional 26 species were detected as incidental observations. Based on information from the Arizona Breeding Bird Atlas (Corman and Wise-Gervais 2005), 20 of the 35 species observed have potential for nesting in the Project Area and may be considered residents during the breeding season (Thompson et al. 2011). Of all observations recorded during fixed-point surveys, 92.5 percent were of the 20 species considered to be likely residents in the Project Area, suggesting the area is utilized more by resident species potentially using the area for nesting than as a corridor for large numbers of migrants. Of the 15 species considered to be migrants in the Project Area, with little or no potential for nesting, only the sage thrasher (*Oreoscoptes montanus;* 27 observations) had more than three total observations during fixed-point surveys (Thompson et al. 2011).

Regardless of bird size, four species (12.1 percent of all species) composed 51.5 percent of all observations: black-throated sparrow (*Amphispiza bilineata*), common raven (*Corvus corax*), horned lark (*Eremophila alpestris*), and turkey vulture (*Cathartes aura*) (Thompson et al. 2011). All four species are potentially resident breeders within the Project Area. None of the four are considered sensitive by state or Federal agencies (AGFD, USFWS, or BLM). Each of the other 31 species individually comprised less than 5 percent of the observations (Thompson et al. 2011).

Bird diversity (i.e., the number of unique species observed) was higher in the spring (21 species) and fall (20) than in the winter (14). Large bird species richness (mean number of species per plot per survey) was higher in the spring (0.60 species/plot/survey) than in the winter (0.22) or fall (0.19) (Thompson et al. 2011). Small bird species richness was also higher in the spring (1.28 species/plot/survey) than in the fall (0.31) or winter (0.25) (Thompson et al. 2011). Common ravens composed 84.1 percent of overall large bird use in winter, 42.3 percent in fall, and 15.8 percent in spring (Thompson et al. 2011). Turkey vultures composed 28.5 percent of the overall large bird use in the fall and 22.0 percent in the spring. Passerine use was highest in the spring (2.31 birds/plot/20-min survey), compared to the winter (0.54), and fall (0.44). Black-throated sparrow had the highest use by any single passerine species during all three seasons (Thompson et al. 2011).

The height of flying birds was recorded as part of surveys to help assess impacts in the rotor sweep area. The zone of risk was defined as a flight height of 77 to 492 feet (23.5 to 150 meters), which is the blade height of many typical turbines currently used at wind-energy projects. Overall, 42.4 percent of large birds observed flying were recorded within rotor swept heights (RSH), 47.2 percent were flying below the RSH, and 10.4 percent were flying above the RSH for potential collision with turbine blades. At the point of initial observation, more than half (56.4 percent) of all raptors observed flying were within the RSH, 38.5 percent were below the RSH, and 5.1 percent were above the RSH. Diurnal raptors had the highest percentage of birds within the RSH, primarily due to 60.9 percent of initial buteo observations recorded at this height. Vultures had the second highest percentage of birds flying within the RSH (51.3 percent), followed by large corvids with 37.3 percent. Doves/pigeons were always observed flying below the RSH, while all but one small bird species (northern rough-winged swallow; 2 observations) observed within the 100-m plots were observed below the RSH (100 percent) (Thompson et al. 2011).

Distribution

For all large bird species combined, use was highest at four survey stations located in the eastern portion of the Project Area, where use ranged 1.0 to 1.04 birds/20-min survey. In this area the topography was gently rolling and dispersed Joshua tree woodland habitats were prevalent. Bird use at other points ranged from 0.23 to 0.57 birds/20-min survey. The high use indices in the eastern portion of the Project Area were attributable to use by Gambel's quail, mourning doves, common ravens, and turkey vultures. Large corvid use was highest at a survey station in Section 3, T28N, R20W (0.56 birds/20-min survey), and ranged from zero to 0.31 birds/20-min survey at other points. Passerine use was highest at point the station in Section 20, T29N, R19W (2.16 birds/20-min survey), and ranged from 0.32 to 1.27 at other points (Thompson et al. 2011). Small bird use was well distributed and showed no obvious patterns, with the highest use recorded at point 2.3 in the northwest and point 1.9 in the eastern portion of the Project (Thompson et al. 2011).

Migratory Birds

Sixty of the 61 native bird species that were detected in the Project Area during avian surveys or as incidental observations are listed as migratory birds and receive protection under the Migratory Bird Treaty Act. Gambel's quail is the only species among these that is not on this list (USFWS 2011b).

Raptors

For the purpose of the bird survey, the following groups were defined as raptors: vultures, hawks, eagles, and owls. Five diurnal raptor species were detected during fixed point count surveys. These included the turkey vulture, red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), American kestrel (*Falco sparverius)*, and merlin (*Falco columbarius*). Incidental observations in the Project Area included the five species detected during the fixed point count surveys and four other diurnal raptor species that included the sharp-shinned hawk (*Accipiter striatus*), northern harrier (*Circus cyaneus*), zone-tailed hawk (*Buteo albonotatus*), and prairie falcon (*Falco mexicanus*). Incidental observations also included three nocturnal raptors: the barn owl (*Tyto alba*), great-horned owl (*Bubo virginianus*), and burrowing owl (*Athene cunicularia*) (Thompson et al. 2011).

Overall, diurnal raptor use was generally well distributed across the Project Area, with slightly elevated use at stations along the eastern portion of the Project Area. Overall raptor use was highly influenced by red-tailed hawks, with red-tailed hawk use largely concentrated among three points in the southeastern extent of fixed-point survey locations (Thompson et al. 2011). There was nothing obviously unique about the habitat in this area, other than perhaps an elevated presence of Joshua trees compared to most other survey points. Topography in this area was gently rolling, with no large cliffs/ridges present. Perhaps the presence of three raptor nest sites within 2.5 miles of these observation points explains some of the elevated use. Falcon use was relatively low across all survey stations, and vulture use was higher and well distributed in the eastern half of the Project Area (Thompson et al. 2011).

Diurnal raptor use was highest at a single survey station in Section 36, T29N, R20W (0.24 birds/20-min survey), while use at other points ranged from 0.03 to 0.17 raptors/20-min survey. This station was located in gently rolling terrain, with no obvious features that should attract raptors; however, the station was rather centrally located between three historical raptor nest sites, all of which were located less than 2.5 miles away from the point (Thompson et al. 2011).

Flight Paths

Flight paths for diurnal raptors and vultures were digitized and mapped. Overall, raptor use was relatively low and widely distributed (Thompson et al. 2011). No obvious flyways or concentration areas were observed for any species, except that golden eagle observations were concentrated in the northwest portion of the Project Area (Tetra Tech 2012a). Eight of the nine golden eagles detected during point counts on the Project site in 2012 were golden eagles in flight. Of these eight golden eagles detected on the Project site, there was a total of 5 minutes of flight time within the rotor swept area. An additional five golden eagles were detected incidentally on the Project site in 2012. The low number of eagle flights documented over the Project Area indicates that it does not contain features (e.g., prey concentrations) that are attractive to the breeding pairs in the occupied territories surveyed. In concordance with the low number of flight paths observed, use rates by golden eagles were relatively low within the Project Area (Tetra Tech 2012a).

Raptor Nests

Golden eagle nest surveys were conducted in 2011 and 2012 (Thompson 2011, Tetra Tech 2012a). In 2011, WEST (Thompson 2011) conducted aerial golden eagle nest surveys following the survey protocol outlined in the Interim Golden Eagle Inventory and Monitoring Protocol (Pagel et al. 2010). A first round of survey was conducted on March 9 and 10, 2011, and a second round was completed on April 21, 2011. Additionally, ground-based surveys were conducted within portions of the Project Area (proposed development corridors at that time) in spring 2008 (Thompson 2011a). In 2012, a two-phase nest survey was conducted to determine occupancy of the known golden eagle breeding areas identified in 2011 (Tetra Tech 2012a). Phase 1 of the nest survey was conducted from the ground on January 14-17, 2012. Phase 2 consisted of two helicopter flights conducted on March 10, 2012 and April 29, 2012.

During the course of eagle nest surveys, five non-eagle nest sites were documented within approximately 0.6 mile of the proposed turbine corridors (Thompson 2011). All five of these nests were believed to be red-tailed hawk nests; however, no birds were observed on two of these nests to confirm identification. Four of the nests were located in Joshua trees and one was located on a transmission line tower. The one nest on the transmission tower is potentially an historical golden eagle nest. Only three of the five nests were located within the overall bounds of the proposed turbine corridors, while the other two were located just east or west of the turbine corridors, which should help to reduce impacts to the resident pairs that utilize these nest sites. Due to the physical structure of Joshua trees, which can obscure nests, additional nests may have been overlooked.

Golden Eagles

Eagle use, consisting solely of use by golden eagles, was highest in the northwestern portion of the Project Area, with all eagle use occurring at three survey sites in this part of the Project Area (Thompson et al. 2011). Two of these points were located in relatively close proximity (0.5 and 0.75 mile, respectively) to a cliff face containing several potential golden eagle nests, although none of the nests were active or occupied in 2011. Due to a lack of previous survey data, it is unknown when the territory was last occupied (Thompson et al. 2011).

During 2011 aerial raptor nest surveys, 36 potential golden eagle nests were documented at 26 different locations within about 10 miles of the Project boundary (Thompson et al. 2011). During the second survey, all of the nests found during the initial survey were re-checked, and due to a change in the Project boundary a small area of additional habitat was searched (via helicopter) along the far southern edge of the new 10-mile buffer. Two golden eagle nests were located in this area (Thompson et al. 2011). AGFD assessed the status of the Project Area and the surrounding territory in February 2011 as part of their statewide golden eagle survey. None of the 36 surveyed nests were occupied or active (i.e. no adults were incubating eggs or tending nests) during the 2011 surveys (Thompson et al. 2011).

Of all the potential golden eagle territories, only two were considered occupied in 2011, with occupancy determined by the presence of adult golden eagles in the vicinity of nest sites (although no eagles or eggs were observed on the nests) (Thompson et al. 2011). A pair of adult golden eagles was observed near a cluster of seven nests located approximately 9 miles south of the southernmost turbine corridor during the first round of survey (Thompson et al. 2011). Although none of the nests in this territory had been tended (i.e., no fresh nest materials observed) and the birds were not incubating, this territory was considered occupied (Thompson et al. 2011). This was the only territory documented as being occupied within 10 miles of the original turbine corridors (Thompson et al. 2011). According to data provided by the BLM, the AGFD located several nests that were within or close to the 10-mile buffer associated with the revised Project boundary of June 28, 2011 (Thompson et al. 2011). The AGFD data reported that a different pair of golden eagles was observed in the vicinity of these other nests during their February 2011 survey flight; and categorized the territory as occupied (Thompson et al. 2011).

Among the potential territories documented, two are located less than 1 mile from proposed turbine corridors; however, none of the nests in these two territories exhibited any evidence of occupancy in 2011. Both territories were considered unoccupied. One potential territory occurs in the northwest corner of the Project Area, a mountainous region near Squaw Peak (Thompson et al. 2011). The second potential territory occurs near the eastern boundary of the Project Area (Thompson et al. 2011).

The remaining nests varied from about 3 to 10.5 miles from the nearest turbine corridors. There was one historical golden eagle nest in the AGFD HDMS located along the major transmission line approximately 0.6 mile of the nearest turbine corridor (Thompson et al. 2011). This nest was likely occupied by red-tailed hawks in 2011.

Eagle surveys in 2012 included a two-phase nest survey. The surveys were conducted to determine occupancy of the known golden eagle breeding areas from 2011 within the Project Area and outward to a distance of 10 miles (nest survey area), and to estimate the productivity of any active nests. Phase 1 of the nest survey was conducted from the ground on January 14-17, 2012 to determine breeding area occupancy for the five breeding areas within the Project Area and outward to a distance of 5 miles. Coverage of ground surveys was limited to a 5-mile radius because of limited accessibility. Each Phase 1 survey consisted of a 4-hour observation period within sight of a known nest or group of nests. Phase 2 consisted of two helicopter flights conducted by the American Eagle Research Institute (AERI). AERI conducted the first flight on March 10, 2012. During this flight, AERI checked all known nests within the nest survey area identified during 2011 surveys that were outside of Wilderness or proposed wilderness. One known breeding area, located in a BLM Wilderness Area, was surveyed from the ground on April 12, 2012. On April 29, 2012, a second flight was conducted under the conditions of a permit issued by the National Park Service to survey known nests located within Lake Mead National Recreation Area proposed Wilderness. During this survey, AERI also checked the status of all nests surveyed on March 10, 2012. Focal nest observations were performed weekly from May 25 – June 15, 2012 at the two active nests nearest the Project Area including one within the Project Area near Squaw Peak and one outside the Project Area to the southwest.

A total of 89 golden eagle nests were detected at an estimated 16 golden eagle breeding areas. Eight breeding areas were classified as occupied, with five of those breeding areas containing one active nest each. The remaining eight breeding areas were classified as unoccupied. This indicated increased occupancy and productivity compared to 2011 surveys that had only two occupied breeding areas and no active nests. The five active nests in 2012 were located in the following breeding areas: Highway 93, Squaw Peak, Temple Bar, Detrital Wash, and Great West Mine. There was at least one nestling in each active nest and a minimum of six young in total present at the five nests on April 29, 2012 and ages of observable young ranged from 3 days to 4.5 weeks. Focal nest observations indicated that young from two of the active nests probably did not survive to fledging. Success of the remaining active nests is unknown. Mean productivity at the five active nests was estimated to be 0.8 young assuming that all unknown-status nestlings successfully fledged. Mean population productivity for the 10-mile radius survey area was estimated at 0.5 fledglings per occupied breeding area assuming that all unknown-status nestlings fledged.

Point count surveys were conducted between January 14 and May 9, 2012 to document eagle movements and behavior within and adjacent to the Project Area. Surveys were conducted at 16 fixed and five rover (i.e., moved adaptively based on flight observations) locations. Surveys were conducted every-other week for nine weeks of surveys, with a 2-hour survey at each of the 16 fixed and two of the five total rover locations occurring every survey week for an unlimited sight distance.

A total of 160 individual point count surveys were conducted at the 21 survey points for a total of 320 hours of observation. A total of 30 observations of eagles were made during point count surveys. Nine of the eagle observations occurred within the Project Area for a mean use of 0.03 eagles per hour within the Project Area. These observations resulted in approximately 5 minutes of flight within the RSA while within the Project Area. An additional six incidental observations of golden eagles occurred during the survey period, five of which were within the Project Area. Mean use from point count surveys in 2012 (0.03 eagles per hour) was lower than that estimated from previous point count surveys (0.06 eagles per hour in spring, 0.09 in winter; adjusted from 20-minute counts) at the Project Area, but results were consistent in that golden eagles were observed infrequently. Eagle observations from point count surveys in 2010-2011 and 2012 tended to occur close to nests. Flight paths of eagles were concentrated in the southern and northwestern part of the Project Area, and the direction of the flights was variable.

The Project Area and surrounding region seem to be sparsely populated by golden eagles. Based on discussions with the resource agencies, there is concurrence that eagle density is low in the Project Area. Surveys conducted on the site and within 10 miles of the Project in 2011 by WEST (Thompson et al. 2011) that include the results from portions of the Project Area flown by AZGFD, and the 2012 ground and aerial-based surveys conducted by Tetra Tech and the AERI provide the best available scientific information that has been incorporated into the Eagle Conservation Plan/Bird Conservation Strategy (ECP/BCS) for the Project.

Game Birds

One upland game bird species was detected: the Gambel's quail (*Callipepla gambelii*). Gambel's quail composed 16.3 percent of the overall large bird use during the spring, and 14.2 percent during the fall. The mourning dove (*Zenaida macroura*) is also a hunted game bird that occurs in the Project Area, and it comprised 20.3 percent of the large bird observations in the spring and 1.8 during the winter. Both species were most common in the eastern part of the Project Area where gently rolling hills and dispersed Joshua tree woodland habitats were predominant (Thompson et al. 2011).

3.5.2.4 Reptiles

Eight reptile species were recorded incidentally in the Project Area, including the Sonoran desert tortoise (*Gopherus agassizii*) and seven species of lizards. Three Sonoran desert tortoise and signs of desert tortoise activity (e.g., scat, tracks, shell remains, and burrows) were observed incidentally within the Project Area (Thompson et al. 2011). These data may indicate that the species is more common in the northern two-thirds of the Project Area, where there is more hilly and mountainous terrain.One desert tortoise was seen on two consecutive days at the same location in September 2008. Signs of desert tortoise activity (e.g., scat and likely burrows) were documented incidental to bird surveys in the spring of 2009. The desert tortoise is a Federally threatened species in its range north and west of the Colorado River (i.e., the Mojave population). As of December 2010, the Sonoran population in the portion of the range south and east of the Colorado River, which includes the Project Area, was entered in the Federal register as a candidate for listing as threatened under the taxonomic name *G. agassizii* (U.S. Fish and Wildlife Service [USFWS] 2010c). The Sonoran population of the desert tortoise also is categorized as a species of special concern (Tier-1b SGCN [species of greatest conservation need]) by the State of Arizona and is classified as sensitive species by the BLM.

3.5.2.5 Amphibians

The Project Area may support a limited number of amphibian species. The geographic ranges of seven amphibian species overlap with the Project Area (Brennen 2010). These species are American bullfrog (*Lithobates catesbeiana*), relict leopard frog (*Lithobates onca*), northern leopard frog (*Lithobates pipiens*), lowland leopard frog (*Lithobates yavapaiensis*), Great Plains toad (*Anaxyrus cognatus*), Arizona toad (*Anaxyrus microscaphus*), and red-spotted toad (*Anaxyrus punctatus*). The American bullfrog, relict leopard frog, northern leopard frog and Arizona toad require various types permanent or semi-permanent surface water in rivers, streams, or ponds that do not exist in the Project Area. The Great Plains toad and red-spotted toad have broader ecological requirements and can exist in drier environments than the aforementioned frogs and toads. These two toad species could use temporary pools for breeding in the Project Area. These two species were not observed during baseline wildlife surveys for bats and birds.

3.5.2.6 Wildlife Movement Corridors

The Arizona Wildlife Linkages Assessment identified the area between the Mount Wilson Wilderness and the Mount Tipton Wilderness as a significant wildlife movement corridor (Arizona Department of Transportation [ADOT] 2006). While this wildlife movement corridor is outside the Project Area, wildlife could move between the While Hills in and near the Project Area, and the Cerbat Mountains about 5 to 10 miles to the south, or other larger mountain ranges from 5 to 15 miles to the east and west of the Project Area (URS communication with Stroud 2010). Given that there is little development, broad areas of topographic relief, and most land is under Federal jurisdiction; the landscape is highly connected and conducive to broader movements of big game, medium-sized mammals, tortoises, or smaller terrestrial wildlife that would not be confined to a corridor.

AGFD and the Arizona Wildlife Linkages Workgroup (AWLW) are currently working on a county-by-county analysis of wildlife movement corridors based on the original Wildlife Linkages Assessment that was completed in 2006 (URS communication with AGFD 2010a). Currently, wildlife corridor analysis for Mohave County has not been completed.

3.5.3 Special Status Species

3.5.3.1 Data Collection Methods

This section is a summary of special status species that may be found in the Project Area and vicinity. The sources of information include published literature, USFWS Arizona Ecological Services Field Office data (USFWS 2010a), AGFD HDMS data (AGFD 2010a), AGFD Project Evaluation Project Online Environmental Review (AGFD 2010b), and AGFD unpublished species abstracts. Potential for occurrence was determined based on wildlife inventories, range distribution maps, resources specialist input, literature, and professional judgment based on habitat type.

Special status species are legally protected under Arizona state law, BLM policies, and ESA. For the purpose of this EIS, special status species are defined as:

- Species proposed for listing as threatened or endangered under ESA (50 CFR 17.11 for listed animals, and various notices in the Federal Register for proposed species)
- Species that are candidates for possible future listing as threatened or endangered under the ESA
- Species or habitats included in BLM Manual 6840, Special Status Species Management, BLM Sensitive Species 2010, and BLM Instruction Memorandum (IM) 2008-050, dated December 18, 2007, Migratory Bird Treaty Act –Interim Management Guidance
- Special status plant species listed as Highly Safeguarded or SR under the ANPL
- BGEPA Compliance, and BLM IM 2010-156 on APPs and eagles requiring development of an ECP/BCS
- Migratory Bird Treaty Act compliance
- Species listed by the State of Arizona as Wildlife Species of Concern

3.5.3.2 Special Status Plants

Information regarding the known distribution and habitats of these special-status plant species was obtained from several sources including AGFD HDMS website, Arizona Flora (Kearney and Peebles 1951), A Field Guide to the Plants of Arizona (Epple 1995), The Jepson Manual (Hickman 1993), correspondence with agency personnel, and internet searches.

A total of 46 special status plant species occur within Mohave County. Many species have multiple designations. For example, Siler Pincushion Cactus (*Pediocactus sileri*) is listed as threatened under the ESA, sensitive species by the BLM, and highly safeguarded under the ANPL. Of the 46 special status plant species that occur within Mohave County, four special-status plant species were identified as potentially occurring in the Project Area based on AGFD HDMS records (Table 3-12). The four species include Las Vegas bearpoppy (*Arctomecon californica*), clustered barrel cactus (*Echinocactus polycephalus* var. *polycephalus*), silverleaf sunray (*Enceliopsis argophylla*), and Navajo Bridge cactus (*Opuntia nicholii*).

Surveys for special status plant species of the Project Area were conducted between April 2008 and May 2008. No USFWS endangered, threatened, candidate, or species of concern; or BLM sensitive species were encountered during surveys (Flaig 2009).

The Arizona salvage-restricted clustered barrel cactus was detected during surveys. A total of 182 individuals were encountered in the northern portion of the Project Area, immediately east of Squaw Peak (Flaig 2009).

Federally Listed Plants

USFWS lists 23 Federally listed plant species as occurring within Mohave County: 2 endangered, 2 threatened, 2 candidate species, and 17 species of concern. No Federally listed plants have the potential to occur in the Project Area.

BLM Sensitive Plants

BLM lists 15 sensitive plant species as occurring within Mohave County. Of the 15 species, the silverleaf sunray is the only BLM sensitive plant species that could potentially occur in the Project vicinity (AGFD

2010a) (Table 3-12). The silverleaf sunray has been documented about 1 mile west of the Project Area (AGFD 2010a) where it is known to occur on gypsum soils in Township 29N; Range 21W. It more than likely occurs within the Project boundary.

Protected Arizona Native Plants

The ANPL lists 30 species as occurring within Mohave County: 5 highly safeguarded and 25 SRspecies. Of these species, AGFD HDMS review indicated that four SR species have been documented in or near the Project Area. These include the Las Vegas bearpoppy, clustered barrel cactus, straw-top cholla (*Cylindropuntia echinocarpa*), and Navajo Bridge cactus (Table 3-12). The cottontop cactus was detected during surveys of the Project Area. The Navajo Bridge cactus has been documented within 5 miles of the Project Area (AGFD 2010a). Straw-top cholla occurs in or near rugged terrain at several sites within about 10 miles of the Project Area. The Las Vegas bear poppy has been documented within 0.6 and 1.18 miles northwest of the Project Area and habitat for this species likely occurs in the northwestern part of the Project Area. All four species could occur in the Project Area.

Plant surveys for the Project identified a number of other protected native plants within turbine corridors in the Project Area. These are shown in Table 3-11. Other cactus and succulents not listed in Table 3-11 but occurring in the Project Area would be protected as either highly safeguarded, SR, or harvest restricted species.

Table 3-11 Salvage Restricted Plant Found within or near the Project Area

Common Name	Scientific Name
clustered barrel cactus	*Echinocactus polycephalus var. polycephalus*
Engelmann's hedgehog cactus	*Echinocereus engelmannii var. nicholii*
Johnson's fishhook cactus	*Echinomastus johnsonii*
desert barrel cactus	*Ferocactus cylandraceus var. lecontei*
common fishhook cactus	*Mammillaria tetrancistra*
buckhorn cholla	*Opuntia acanthocarpa*
beavertail cactus	*Opuntia basliaris var. basilaris*
teddy-bear cholla	*Opuntia bigelovii*
Mojave pricklypear	*Opuntia erinacea var. erinacea*
pencil cactus	*Opuntia ramosissima*
Joshua tree	*Yucca brevifolia*
Mohave yucca	*Yucca schidigera*

SOURCE: Flaig 2009

3.5.3.3 Special Status Wildlife

Federally Listed Wildlife

As identified by USFWS, 22 species listed as endangered, threatened, or candidate under the ESA occur in Mohave County. Of this total, two species with Federal status have the potential to occur in the Project Area. The relationship of these two species to the Project is described in Table 3-12.

However, in the evaluation of this Project, the USFWS agreed with the BLM's initial determination that no federally listed threatened or endangered species, and/or critical habitat currently occur in the area so none would be affected by the Project.The California condor (*Gymnogyps californianus*) is listed as endangered, and the reintroduced population in Arizona is categorized as an experimental, non-essential population (NEP) under rule 10(j) of the ESA. Since this condor NEP occurs outside of National Park Service or USFWS refuge lands, it is managed as a "proposed" species under ESA. Section 7(a)(4) requires Federal agencies to informally confer with the Service on actions that are likely to jeopardize the continued existence of a proposed species. The Mohave County Wind Farm Project Area is within the limits of the condor NEP. The reintroduced population is approximately 100 miles from the Project Area and has been expanding its foraging range to the north and northeast of its release site near Grand Canyon National Park and has not utilized areas to the south since about 2000 (USFWS 2010b). This may represent a natural pattern related to the scarcity of carrion from livestock and from large game species like deer and elk.

The USFWS registered the Sonoran population of the desert tortoise (*Gopherus agassizii*) as a candidate species for threatened status under the ESA in December 2010, with listing precluded by other priorities (USFWS 2010c). During resource surveys, Sonoran desert tortoise and signs (e.g., scat, tracks, shell remains, and burrows) were observed incidentally within the Project Area (Thompson et al. 2011). The BLM and AGFD biologists surveyed the Project Area and determined the tortoise occupied the northern two-thirds of the Project Area, where there is more hilly and mountainous terrain. In Arizona, the BLM manages the desert tortoise in accordance with IM No AZ-2009-010 which establishes policy to mitigate for residual impacts of loss of habitats including compensation in categorized lands. This policy was established in the "Desert Tortoise Habitat Management on Public Lands; A Rangewide Plan" (Spang et al. 1988). The plan designates occupied desert tortoise habitats by three categories. Category I habitat is intended to maintain stable, viable populations of the tortoise, protect existing tortoise habitat, and increase populations where possible. Category II habitat should maintain stable, viable populations and halt further tortoise declines. Category III habitat should limit tortoise habitat and population declines to the extent possible by mitigating impacts. The Project Area does not contain Category I and II habitats; However, Category III habitat is present in the northern two-thirds of the Project Area.

BLM Sensitive Wildlife

BLM lists 26 sensitive wildlife species as occurring within Mohave County. Of the 26 species, eight species occur or potentially occur in the Project Area: Allen's big eared bat (*Idionycteris phyllotis*), Townsend's big-eared bat (*Corynorhinus townsendii*), western mastiff bat (*Eumops perotis*), golden eagle, American peregrine falcon (*Falco peregrinus anatum*), ferruginous hawk (*Buteo regalis*), western burrowing owl (*Athene cunicularia*), and Sonoran desert tortoise (refer to Table 3-12). Allen's big-eared bat, Townsend's big-eared bat, western mastiff bat, golden eagle, and western burrowing owl were documented as part of the baseline wildlife surveys for the Project (Thompson et al. 2011).

Arizona Wildlife of Concern

AGFD lists 29 wildlife species of concern as occurring within Mohave County. Of these species, three species have the potential to occur in the Project Area: American peregrine falcon, ferruginous hawk, and Sonoran desert tortoise (refer to Table 3-12). The Sonoran desert tortoise has been documented within the Project Area, and the ferruginous hawk has been documented within about 10 miles of the Project Area.

The banded Gila monster (*Heloderma suspectum cinctum*) receives general protection under Arizona statutes. Records of the species occur within 5 miles of the Project Area, and suitable habitat occurs in the Project Area, primarily in mountainous terrain near Squaw Peak.

Eagles

The bald eagle and golden eagle are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Both species have been documented within 5 miles of the proposed Project Area. The local population of overwintering bald eagles would likely remain near Lake Mead. Of the two species, the golden eagle utilizes habitats within the proposed action alternatives boundaries. Golden eagles were documented using the Project Area, and nests were located in and surrounding the Project Area during baseline wildlife surveys (Thompson et al. 2011). Section 3.5.2.3 describes the survey results for golden eagles in greater detail. The local population of overwintering bald eagles would likely remain near Lake Mead.

During aerial raptor nest surveys, 36 potential golden eagle nests were documented at 26 different locations within about 10 miles of the Project boundary. None of the 36 surveyed nests were occupied or active (i.e. no adults were incubating eggs or tending nests) during the 2011 surveys (Thompson 2011). Of all the potential golden eagle territories incorporating these nest locations, only two were considered occupied in 2011, with occupancy determined by the presence of adult golden eagles in the vicinity of nest sites (although no eagles or eggs were observed on nests) (Thompson 2011). As described in Section 3.5.2.3, a total of 89 golden eagle nests were detected at an estimated 16 golden eagle breeding areas in the 2012 eagle surveys. Eight breeding areas were classified as occupied, with five of those breeding areas containing one active nest each. The remaining eight breeding areas were classified as unoccupied.

Table 3-12 Special Status Species Potentially Occurring in the Project Area

Species Common Name Scientific Name	Status	Habitat Requirements	Occurrence Potential
Birds			
American Peregrine falcon *Falco peregrinus anatum*	S WSC MBTA	Breeds in Arizona wherever sufficient prey is available near cliffs. Areas of spectacular cliffs such as the Mogollon Rim, Grand Canyon, and Colorado Plateau contain most of Arizona's breeding peregrines. Optimum peregrine habitat is generally considered to be steep, sheer cliffs overlooking woodlands, riparian areas or other habitats supporting avian prey species in abundance (AGFD 2002d).	**Likely.** Peregrine falcons are known to nest along the Colorado River below Hoover Dam and along the shoreline of Lakes Mead and Mohave. These known nesting sites are within 15 miles of the Project Area, and peregrine falcons could utilize the Project Area as a possible foraging site.
California condor *Gymnogyps californianus*	E (managed under 10(j) rule) MBTA	Condors are cavity-nesting species that require caves, ledges, or large trees in order to nest. High perches are necessary for roosting, as well as to create the strong updrafts required for lift into flight. Open grasslands or savannahs are important to condors while searching for food. In Arizona, condors are found at elevations between 2,000-6,500 feet (610-1,981 meters). In northern Arizona, condors are located primarily near the Vermilion cliffs and Grand Canyon (AGFD 2004).	**Unlikely.** Limited suitable habitat in the Project Area. No known populations within or near the Project Area, and sources of carrion for forage are limited. The reintroduced population in Arizona is approximately 100 miles from the Project Area.
Ferruginous hawk *Buteo regalis*	S (Breeding population only) MBTA WSC	Ferruginous hawks breed in northern Arizona on the Colorado Plateau; otherwise, this species occurs in Arizona from September to April. This species can be seen in virtually any part of Arizona with open environs, particularly in agricultural fields and native grasslands. In general, the Ferruginous hawk breeds in open areas with little topographic relief. Hunting areas are typically open grasslands, preferably those dotted with suitable low hills or short trees which serve as perches (AGFD 2003a). Elevation: 3,500-6,000 feet (1,067-1,830 meters).	**Possible.** Likely suitable habitat in the Project Area for overwintering ferruginous hawks. Records within 10 miles of the Project Area

Species Common Name Scientific Name	**Status**	**Habitat Requirements**	**Occurrence Potential**
Golden Eagle *Aquila chrysaetos*	S MBTA BGEPA	Typically found in open country, including shrublands, grasslands, canyons, and desert plains, as well as open coniferous forests in mountainous regions (AGFD 2002b).	**Present.** Suitable habitat present within the Project Area. Species detected in northwest part of Project Area. Numerous nests documented in parts of the Project Area and within a 10 mile buffer area around the Project.
Bald Eagle *Haliaeetus leucocephalus*	MBTA BGEPA	In Arizona, overwintering bald eagles usually roost in riparian areas with mature trees, particularly large mature cottonwoods that are adjacent to large bodies of water (major rivers, lakes, or reservoirs) with abundant prey (large fish and waterfowl). Roost areas sometimes include mature pine forests or canyon rims.	**Unlikely.** Suitable habitat is not present within the Project Area. However, individuals overwinter in the vicinity of Lake Mead. A record of the species is within 5 miles of the northwestern corner of the Project Area.
Western burrowing owl *Athene cunicularia*	MBTA S	Occurs locally in open areas, generally year-round, with only a few winter records on the Colorado Plateau in the northeastern part of the state. Prefers variable habitat in open, well-drained grasslands, steppes, deserts, prairies, and agricultural lands, often associated with burrowing mammals. Sometimes in open areas such as vacant lots near human habitation, golf courses or airports (AGFD 2001a). Elevation: 650-6,140 feet (198-1,873 meters).	**Present.** Numerous documented occurrences in Project Area during agency surveys.
Mammals			
Allen’s big-eared bat *Idionycteris phyllotis*	S	In Arizona, bats are found in ponderosa pine, piñon-juniper, Mexican woodland and riparian areas of sycamores, cottonwoods and willows. They have also been found in white fir and in Mojave desert scrub. These bats typically occur along streams or over ponds where the bats may be seeking insects, water or both. They roost in caves and abandoned mineshafts (AGFD 2001c).	**Present.** Species detected during surveys.

Species **Common Name** **Scientific Name**	**Status**	**Habitat Requirements**	**Occurrence Potential**
Townsend's Big-eared Bat *Corynothinus townsendii pallescens*	S	In Arizona, summer day roosts are found in caves and mines from desert scrub up to woodlands and coniferous forests. Night roosts may often be in abandoned buildings. In winter, they hibernate in cold caves, lava tubes and mines mostly in uplands and mountains from the vicinity of the Grand Canyon to the southeastern part of the state (AGFD 2003b).	**Present.** Species detected during surveys.
Western mastiff bat *Eumops perotis*	S	This species is considered a year-round resident in Arizona. Bats occur from lower and upper Sonoran desert scrub near cliffs, preferring rugged rocky canyons with abundant crevices (AGFD 2002c).	**Present.** Species detected during surveys.
Plants			
Clustered barrel cactus *Echinocactus polycephalus* var. *polycephalus*	SR	This species is found in the driest parts of the Sonoran and Mojave deserts in Mohave and Yuma counties. Plants occur on rocky flats and washes, bajadas, rock ledges, and rocky, gravely slopes in the driest parts of the Sonoran and Mojave deserts (AGFD 2006).	**Present.** Species detected during surveys and is widespread in the region.
Las Vegas Bearpoppy *Arctomecon californica*	SR	Las Vegas bearpoppy occurs on barren, gravelly desert flats, shale, hummocks and slopes in the creosote bush zone, that are heavily gypsiferous or otherwise chemically unusual (borate-bearing, lithium-bearing). In Arizona, this species is found in Mojave desert scrub within the Grand Canyon, on narrow gravelly Formation and Devonian limestone shelves high on the slopes of side canyons (AGFD 2005a).	**Likely.** Suitable habitat in part of Project Area. Known populations in the Detrital Valley. Closest record is between 0.56 and 1.18 miles west of northwest corner of Project Area.
Straw-top cholla *Cylindropuntia echinocarpa*	SR	Gravelly to rocky flats, bajadas, and canyons, often along the margins of washes with suitable substrate.	**Likely.** This species is common and widespread in the region and should be found throughout the Project Area.
Navajo Bridge cactus *Opuntia nicholii*	SR	This species occurs on barren areas with saltbush and *Ephedra* with limestone or red, sandy soils.	**Likely.** Suitable habitat may be present within the Project Area.

Species Common Name Scientific Name	Status	Habitat Requirements	Occurrence Potential
Silverleaf sunray *Enceliopsis argophylla*	S	Silverleaf sunray is found in warm desert shrub communities on dry slopes and sandy washes. It occurs on clay and gypsum cliffs, gravelly slopes, and sandy washes (AGFD 2005b).	**Likely.** Known to occur within 1 mile of the Project Area and is likely to occur within the Project Area.
Reptiles			
Banded Gila monster *Heloderma suspectum cinctum*	State Protected	In Arizona, banded Gila monsters primarily occur in the Sonoran Desert and extreme western edge of the Mojave Desert. It is less frequent in desert-grassland and rare in oak woodland. The species is most common in undulating rocky foothills, bajadas and canyons; and found less frequently or absent on open sandy plains (AGFD 2002e).	**Likely.** Suitable habitat may be present within the Project Area. The species has been recorded in or within 5 miles of the Project Area.
Sonoran desert tortoise *Gopherus agassizii* (Sonoran population)	C S WSC	The Sonoran population of the desert tortoise occurs primarily on rocky slopes and bajadas of Mojave and Sonoran desert scrub. Caliche caves in incised, cut banks of washes (arroyos) are also used for shelter sites, especially in the Lower Colorado River Valley subdivision. Shelter sites are rarely found in shallow soils (AGFD 2001b).	**Present.** Species detected during surveys.

NOTES: <u>Agency or Law:</u> BLM = Bureau of Land Management; ESA = Endangered Species Act; MBTA = Migratory Bird Treaty Act; BGEPA = Bald and Golden Eagle Protection Act. <u>Status Definitions:</u> **ESA:** E= endangered, C= candidate, and SC = species of concern. **BLM**: S = sensitive. **State of Arizona:** WSC = wildlife of special concern in Arizona, SR = salvage restricted plant under the Arizona Native Plant Laws. <u>Occurrence Potential Definitions:</u> Present = individuals documented in the Project Area. Likely = habitat is large enough in the Project Area and has the qualities required by the species; Unlikely = suitable habitat is absent or too small in the Project Area to be useable by the species.

3.6 CULTURAL RESOURCES

3.6.1 <u>Introduction</u>

The cultural environment includes those aspects of the physical environment that relate to human culture and society, along with the institutions that form and maintain communities and link them to their surroundings (King and Rafuse 1994). This section describes cultural resources, including archaeological sites, historical sites and structures, and traditional cultural resources, that could be affected by the Project.

3.6.1.1 Regulatory Requirements

Cultural resources are addressed in this EIS pursuant to Section 101(b)(4) of NEPA, which directs Federal agencies to preserve important historical and cultural aspects of our nation's heritage. Cultural resource issues also were addressed in accordance with other applicable Federal laws and regulations, particularly Section 106 of the National Historic Preservation Act (NHPA), which directs Federal agencies to consider the effects of their undertakings on properties listed in or eligible for the National Register of Historic Places (National Register) and seek to avoid, minimize, or mitigate potential adverse effects of the undertaking on identified historic properties in consultation with the State Historic Preservation Officer (SHPO) and other interested parties. To be eligible for the National Register, properties must be 50 years old (unless they have special values) and have national, state, or local significance in American history, architecture, archaeology, engineering, or culture. They also must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet at least one of four criteria:

Criterion A: be associated with significant historical events or trends

Criterion B: be associated with historically significant people

Criterion C: have distinctive characteristics of a style or type, or have artistic value, or represent a significant entity whose components may lack individual distinction

Criterion D: have yielded or have potential to yield important information (36 CFR Part 60)

The regulatory procedures that Federal agencies follow to comply with Section 106 of the NHPA often are coordinated with the NEPA process but are a requirement independent of NEPA. Under NHPA, consideration of adverse effects is limited to historic properties (including traditional cultural properties) that are listed in or determined eligible for the National Register. A broader range of resources can be considered under NEPA. When coordinated, both processes share similar steps of inventory and evaluation of the significance of potentially affected resources as well as assessment of impacts and consideration of measures to resolve any adverse impacts.

3.6.1.2 Region of Influence (Area of Potential Effects)

The cultural resource assessment for this Project was designed to address potential impacts within the region of influence, which is the geographic area within which a proposed project may affect resources. The concept is analogous to the area of potential effects of an undertaking as defined by regulations implementing Section 106 of the NHPA for considering effects on National Register-listed or eligible properties (36 CFR Part 800). The area of potential effects and region of influence can vary for each type of potential impact on the cultural environment.

The programmatic EIS that BLM prepared for wind energy development in the West concluded that earthmoving activities, such as digging, grading, and clearing of vegetation have the highest potential for disturbing or destroying significant cultural resources (BLM 2005). The programmatic EIS also recognized that associated vehicle and pedestrian traffic has potential to disturb or crush artifacts and archaeological and historical features. Accordingly, the area of potential effects for direct impacts was defined as the area that could be disturbed by construction, operation, and eventual decommissioning of the Project. Although this could include the entire area within the proposed Project boundaries, preliminary engineering indicates that actual ground disturbance could accumulate to a maximum of 2.5 square miles, or slightly more than 3 percent of the total 73.5 square miles of ROW.

The BLM programmatic EIS for wind energy development also recognized the potential for indirect impacts due to (1) visual changes in the settings of cultural resources, (2) soil erosion stemming from construction disturbances, and (3) unauthorized collection and vandalism stemming from improved vehicle access to a currently remote area and more people being present.

Archaeological sites important for their potential to yield important information generally would not be affected by visual changes, but settings might be an important element of the historical values of other types of resources, such as historic trails and roads, historic buildings and structures, and traditional cultural resources. BLM visual resource management (VRM) analyses evaluate effects on the visual character of resource settings within foreground and middleground distances, which are defined as extending 3 to 5 miles, and in some cases in background or seldom seen settings that might extend as much as 15 miles or more. In conformance with this method of visual impact analysis, the area of potential effects for visual impacts was defined as extending up to 5 miles beyond the Project Area, but potential impacts on known cultural resources that could be sensitive to visual impacts were considered out to 20 miles in conjunction with visual resources studies conducted for the Project. Visual resources are discussed in detail in Section 3.12.

Construction activities that modify the slope of the natural terrain or compact soils have potential to increase erosion, which might affect the integrity of cultural resources. Because construction activities would comply with regulations regarding the control of storm water discharges, there is only minor potential for increased soil erosion to damage cultural resources. Such secondary impacts are likely to be confined to the immediate vicinity of construction zones. The area of potential effects for increased erosion was defined as extending no more than 100 feet beyond the construction zones.

Studies have demonstrated that, in rural settings, the integrity of archaeological and historical sites near roads is much more likely to have been diminished by unauthorized artifact collection and vandalism than sites in more remote settings (Ahlstrom et al. 1992; Nickens et al. 1981; Simms 1986; Spangler 2006; Spangler et al. 2006). The impacts of unauthorized collection and vandalism vary with distances from roads, but the types and visibility of sites also are important factors. For example, historic structures are more vulnerable than artifact scatters. It is anticipated that the potential for such impacts would be greatest within 300 to 600 feet of existing or new roads, depending on the visibility of a site or public knowledge of its location.

3.6.1.3 Inventory Methods

To address the identified issues, nine reports were completed to inventory, evaluate, and assess impacts on archaeological, historical, and traditional cultural resources (Bungart 2013; Kirvan and Rogge 2011a, 2011b; Rogge 2010, 2011a, 2011b, Rogge and Albush 2010; Rogge et al. 2010, 2011). The initial phase of study involved preparation of a cultural resource overview (Class I inventory), which compiled and mapped, in a geographic information system (GIS) database, information about prior cultural resource studies and archaeological and historical sites recorded within the Project Area and a 1-mile buffer. Information about prior studies and recorded cultural resources also was compiled, reviewed, and summarized in tables for areas 1 to 5 miles around the Project Area. The surrounding area out to 20 miles beyond the Project Area was reviewed to identify known cultural resources with values that might be affected by visual changes of the landscape.

Primary sources of information included the BLM Kingman Field Office files, the AZSITE Cultural Resources Inventory, and consultations with tribes and agencies. AZSITE is a GIS database that includes records of the AZSITE Consortium members (Arizona State Museum, Arizona State University, Museum of Northern Arizona, and SHPO), and participating agencies such as BLM. National Register listings also were reviewed. General Land Office plats and other historical maps were reviewed as well for indications of potential unrecorded historical resources. Additional information was collected at the Mohave Museum of History and Arts in Kingman, and selected reports of prior studies were reviewed. Ethnographic and ethnohistoric reports were reviewed for information about traditional land uses and traditionally named places in and near the Project Area (e.g., Dobyns 1956, 1957, 1976; Euler 1958; Kroeber 1935; Manners 1974; McGuire 1983; Stone 1987).

Intensive pedestrian (Class III) field survey was conducted to inventory cultural resources within the area of potential effects for direct construction impacts as well as surrounding buffers where potential impacts due to increased erosion and unauthorized artifact collection and vandalism might occur. Based on preliminary engineering, corridors about 650 feet wide were surveyed for the turbine corridors, and corridors about 400 feet wide were surveyed for the access roads/electrical collector lines. Additional areas were surveyed for a main access road; meteorological towers; construction staging and laydown areas; an operation and maintenance building; alternative locations for substations, a switchyard, and an interconnection transmission line; and for geotechnical investigations. The Class III survey covered about 16 square miles (10,248 acres), which is six to seven times more area than the estimated extent of construction disturbance. The surveyed buffer zones are likely to accommodate shifts of facility locations as final designs are prepared, but additional supplemental survey could be required as more detailed construction plans are developed.

BLM also arranged for the Hualapai Tribe to conduct an ethnohistoric study to further investigate traditional cultural use of the Project Area and inventory and evaluate traditional cultural resources (Bungart 2013). (Ethnography is a branch of anthropology that investigates specific human cultures, and ethnohistory combines ethnography and history.)

3.6.2 Regional Overview

The following brief summary of the regional cultural history provides a context for evaluating the cultural resources that could be affected. This summary is based on a Class I cultural resource inventory prepared by BLM for west-central Arizona (Stone 1987) and an overview prepared for the Project (Rogge 2011a, 2011b; Rogge et al. 2010), which is incorporated into this EIS by reference and provides additional details and citations of relevant prior studies.

Almost a century of archaeological and historical research has documented that the region has been occupied for at least 14,000 years. The cultural history of the area can be divided into numerous periods that reflect changing adaptations and lifeways, including Paleoindian, Archaic, Ceramic, Ethnohistoric, and historic Euro-American periods.

The earliest traces of human occupation in northwestern Arizona date to the Paleoindian period (about 12,000 to 8,000 B.C.) when the cooler and wetter climate of the late Pleistocene era of the last Ice Age transitioned to the subsequent Holocene period with climatic conditions similar to those of today. Paleoindians hunted various species of game including large, now extinct, herbivores such as mammoths, horses, camels, and ancient bison. Paleoindian sites are rare, and evidence of this early period in the region is limited mostly to isolated finds of large spear points made of finely flaked stone.

The Paleoindian period was followed by the Archaic period, a long post-Pleistocene epoch that followed the retreat of continental glaciers and the extinction of the large Pleistocene game species. This period may have lasted as late as A.D. 700 in northwestern Arizona. Like the earlier Paleoindians, Archaic groups continued to pursue a hunting and gathering way of life, typically traveling in small bands through their territories to hunt various game species and collect and process indigenous plant foods with the changing seasons. The Archaic period commonly is divided into early, middle, and late periods based primarily on various styles of stemmed and notched dart points made of flaked stone. Few sites dating to the early and middle Archaic periods have been found in northwestern Arizona, but sites dating to the late Archaic period are more common and probably reflect population growth.

The Ceramic period is marked by the making and use of pottery, the growing of domesticated crops, and more permanent or semi-permanent habitations. During the Ceramic period (circa A.D. 700 to 1850), the Cerbat culture occupied the region where the proposed Project is located. The tradition is characterized by the use of Cerbat Brown pottery; flat and shallow basin milling stones; one-hand grinding stones; small, triangular arrow points; use of rockshelters and brush wikieups; and cremation burial. The Cerbat people raised crops at selected, well watered locations, but continued to rely heavily on hunting game and gathering indigenous plant foods for much of their subsistence. In contrast to many other cultural groups in the Southwest who became fully sedentary farmers at this time, the Cerbat continued to move seasonally throughout their territory to exploit various natural resources similar to the hunting and gathering cultures of the Archaic period.

The Project Area is within the traditional territory of the ethnohistorically documented Hualapai, who speak a Yuman language and represent a continuation of the prehistoric Cerbat culture. The Yavapai, who lived to the south, also speak a Yuman language, but relations between the two groups during the ethnohistoric period were often hostile. The traditional territory of the Mojave, a lowland Yuman group, was west of the Project along the Colorado River. The Chemehuevi, a band of Southern Paiute, lived along the river too but also ranged into the desert west of the river. Most of the related Southern Paiute bands lived north of the Colorado River. Traditionally, the Hualapai were organized into camps, commonly of about 25 to 40 people of patrilineally related families. The camps were organized into approximately 7 to 14 larger bands, each with home territories, and the bands were organized into three subtribes. Although the Havasupai are recognized as a distinct tribal government today, in earlier times they seem to have been essentially another band of the Hualapai. The Project Area is within what was the territory of the Red Rock Band at the northwestern edge of Hualapai territory. Band and tribal territories were fluid and members of other Hualapai bands and other tribes in the region may have traveled through or hunted and gathered natural resources in the area, and traded with, intermarried, and resided temporarily with the Red Rock Band.

The Hualapai bands lived in winter camps near springs located in canyons eroded into the flanks of mountain ranges, such as the Cerbat Mountains south of the Project Area, or in canyons cut into the Colorado Plateau to the east. The Hualapai raised crops at some springs. The camps moved or sent out work groups with the changing seasons. In spring, they gathered agave in upland areas. In the summer they harvested grass seed and seeds of other plants on the valley floors. During the late summer, yucca and prickly pear were gathered in canyons, and in the fall acorns and pinyon nuts were collected in the mountains before returning to the winter camps at lower elevations. That settlement and subsistence strategy apparently was pursued for centuries, if not millennia.

European explorers traveled north out of Mexico into what is now Arizona in the early sixteenth century. Although Spain, and then independent Mexico, claimed hegemony over the area for more than three centuries, they made no attempt to settle near the Hualapai. The Spanish priest Francisco Garcés probably was the first European to encounter the Hualapai, when he passed through their territory as he traveled from the Colorado River east to the Hopi villages in 1776. Native guides undoubtedly led Garcés to the

Hopi villages over long established trade routes. The presence of the newcomers near the Hualapai increased after 1829 when Antonio Armijo, a merchant from Santa Fe, led a caravan of about 60 men and 100 mules from Mexican settlements in northern New Mexico to missions in California along a route that later became known as the Old Spanish Trail. A segment of Armijo's original route down the Virgin River valley to the Colorado River is beneath Lake Mead, about 16 miles north of the Project Area.

The situation changed rapidly in 1848 when Mexico ceded land north of the Gila River to the United States with the Treaty of Guadalupe-Hidalgo that concluded the War with Mexico. The U.S. Army soon built a series of forts and camps, including Fort Mojave (1859-1890), Camp Hualapai (1869-1873), and Camp Beale's Springs (1871-1874) in and near Hualapai territory, and conquered native groups and forced them onto reservations. The U.S. Army began issuing rations to the Hualapai at Camp Beale's Springs (near Kingman) in 1871. When the administrative control of the Hualapai was transferred from the War Department to the Office of Indian Affairs in 1874, many of the Hualapai were confined to the Colorado River Indian Tribes Reservation for a year. When the Hualapai returned from their traditional territory they found that Euro-Americans had taken control of their water sources and much of the range they depended on for sustenance.

A reservation was established for the Hualapai in 1883, but the Office of Indian Affairs initially leased much of it to Euro-American ranchers. After many Hualapai died during the influenza epidemic of 1918, many of the survivors moved onto the reservation near Peach Springs. A tribal government was organized in 1934. Today, the tribe manages a reservation of approximately 1,550 square miles and has approximately 2,300 enrolled members.

In addition to conquering aboriginal groups, the U.S. Federal government devoted substantial efforts to developing transportation routes. Edward F. Beale and a team of military surveyors and laborers blazed a 1,000-mile-long wagon road from Fort Smith, Arkansas, to California between 1857 and 1859. The Atlantic & Pacific Railroad (known as the Atchison, Topeka & Santa Fe Railway after 1902) was built in that corridor between 1881 and 1883, and led to the founding of Kingman in 1882. Segments of Beale's Wagon Road and the Atlantic & Pacific Railroad followed the aboriginal trade route that Garcés' followed to the Hopi villages about a century earlier. Kingman became the Mohave County seat in 1887, after earlier county seats at the Colorado River towns of Mohave City and Hardyville and the mining communities of Cerbat and Mineral Park declined. In the 1860s, Mormons began to operate ferries on the Colorado River to accommodate expansion of settlement south from Utah. Mormon missionary Jacob Hamblin first ferried across the river near the confluence with Grand Wash in 1863 and Harrison Pearce developed a ferry at that location in 1876. Stone's Ferry was established before 1870 at the confluence with Detrital Wash and was moved about 3 miles upstream to the Virgin River confluence, and became known as Bonelli's Ferry or Rioville after Daniel Bonelli acquired the ferry in 1875. Those ferries led to the development of wagon roads south of the Colorado River along the Detrital and Hualapai valleys west and east of the Project Area.

After the 1848 gold rush to California waned, many prospectors moved into Arizona (part of the New Mexico Territory until 1863) in the 1850s and 1860s. Gold and silver were discovered in the Cerbat Mountains in the 1860s and in the 1870s gold was discovered farther north in Gold Basin where a mining district was organized in November 1881 east of the Project Area, but lack of water and fuel thwarted extensive mining.

A Hualapai shaman, Indian Jeff, discovered silver in the White Hills District, and in 1892 he revealed the location of the discovery for a fee, triggering a mining rush. By 1894, the town of White Hills had a population of 1,200, but the ore was mostly exhausted within four years and the community faded away. The townsite and mine shafts were flooded by a flash flood in 1899, and by 1902 all businesses were closed. An attempt to reopen the mines in 1922 failed, and renewed exploration in the 1970s concluded there was insufficient ore to justify development. Meager remnants of the White Hills townsite are about 2 miles south of the Project Area.

Damming of the Colorado River, beginning with the completion of the Hoover Dam in 1935, stabilized agricultural development and stimulated growth of an economy based on recreation and retirement communities such as Bullhead City, Arizona, and Laughlin, Nevada. The NPS assumed administration of the Boulder Dam Recreation Area in 1936 and amended their cooperative agreement with Reclamation to include the future Lake Mohave to the south in 1947. It was officially designated Lake Mead National Recreation Area and became a unit of the National Park System in 1964.

3.6.3 Archaeological and Historical Resources

The cultural resources overview identified information about 42 prior cultural resource studies conducted since the 1950s within or overlapping the proposed Project Area and facilities, and a surrounding 1-mile-wide buffer. Information was identified about 62 additional studies within 1 to 5 miles. The only cultural resource previously recorded in the Project Area is the Liberty-Mead 345-kilovolt (kV) transmission line, which was put into operation in 1967. Although the line is not yet 50 years old, the segment of the line within the Lake Mead NRA has been evaluated as eligible for the National Register because it is an early example of considering aesthetic factors in the design of high-voltage transmission lines, but the segment within and near the Project Area lacks historical significance.

One historical resource, U.S. Highway 93 (US 93), was previously recorded within 1 mile of the Project Area and evaluated as eligible for the National Register for its potential to yield important information about the historic state highway system (Criterion D). The overview identified 21 other archaeological and historical sites recorded within 1 to 5 miles of the Project Area. Those sites include the historic mining town of White Hills and three camps where Hualapai laborers and their families lived around the margins of the town. Nine other sites date to the historic period and most are related to mining. Six sites date to the prehistoric period and most are artifact scatters. One site is Senator Mountain, which was identified as a traditional Hualapai cultural place. The recorders of 5 of those 21 sites recommended that they be considered eligible for the National Register and that 7 be considered ineligible. The National Register eligibility of the other 9 sites had not been evaluated.

Intensive field surveys conducted for the Project discovered 33 archaeological and historical sites and 218 isolated artifacts and features (Kirvan et al. 2011; Kirvan and Rogge 2011a, 2011b). Although most of the areas that could be disturbed by the proposed wind farm have been intensively surveyed, the locations of some Project components could be moved during preparation of final designs and require supplemental cultural resource survey. Background research and the field survey indicate that cultural resources are sparse in the area but some additional cultural resources might be discovered by supplemental survey.

About one-fourth of the isolated artifacts and features reflect the prehistoric occupation of the area and are mostly pieces of flaked stone. The other three-fourths date to the historic or modern era and are primarily cans, fragments of broken bottles, and mining claim and cadastral survey markers. BLM has evaluated all the isolated artifacts and features, which do not meet the Arizona State Museum standards for formal designation as archaeological sites, as not meeting the criteria for inclusion in the National Register.

Nine of the 33 recorded archaeological and historical sites are prehistoric toolstone collecting and knapping locations. Those sites vary in size and quantity of artifacts but they are similar and lack any features, except for a few concentrations of flaked stone that probably represent knapping stations and one possible anvil stone. All nine of those sites were evaluated as eligible for the National Register under Criterion D for their potential to yield important information. The historic Stone's Ferry Road also was evaluated as eligible for the National Register under Criterion D. Eleven other sites, including 3 corrals or livestock watering locations related to ranching, 1 trash dump along US 93, and 7 roads were evaluated as ineligible for the National Register. The 13 other sites are in locations where Project facilities are no longer being considered, and their National Register eligibility was not evaluated because they would not be affected by the proposed Project (Table 3-13).

Table 3-13 Recorded Archaeological and Historical Sites

Site Number, Name		Affiliation, Age	Site Type	Features, Artifact Counts	Site Size
Sites Eligible for the National Register of Historic Places[1]					
1	AZ F:3:25(ASM)	aboriginal	toolstone collecting and knapping	Features: 1 anvil stone (embedded boulder), Artifacts = 25	less than 0.1 acre
2	AZ F:3:26(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts: 37	0.1 acre
3	AZ F:3:31(ASM)	aboriginal, Archaic	toolstone collecting and knapping	Features: 1 knapping station Artifacts: 3,000 (estimated)	20.0 acres
4	AZ F:3:32(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts: 3,000 (estimated)	2.1 acres
5	AZ F:3:33(ASM)	aboriginal	toolstone collecting and knapping	Features: 9 knapping stations Artifacts: 113	1.1 acres
6	AZ F:3:34(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts: 7,000 (estimated)	1.5 acres
7	AZ F:3:35(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts: 2,000 (estimated)	0.7 acre
8	AZ F:3:36(ASM)	aboriginal	toolstone collecting and knapping	Features: 5 knapping stations Artifacts: 199	0.8 acre
9	AZ F:3:37(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts 8,000 (estimated)	2.3 acres
10	AZ F:3:43(ASM) Stone's Ferry Road	Euro-American, late 19th century	historical road with campsites and artifacts	Features: 3 possible campsites Artifacts: scattered along the road	11.5 miles long, 0.1 mile in survey area
Sites Not Eligible for the National Register of Historic Places					
1	AZ F:2:116(ASM)	Euro-American, circa 1930s to 1950s	trash dump	Features: trash dump, trash scatter, two-track road Artifacts: 49 in scatter, thousands in dump	0.5 acre
12	AZ F:3:24(ASM) White Hills–Temple Bar Road	Euro-American, late 19th century	road and telephone line	Features: 41, including road, pole remnants and anchors (rock stacks), grading stakes, and artifact clusters Artifacts: 2,046 (mostly cans and broken glass) inventoried in survey area	23.9 miles long, 7.1 miles in survey area
13	AZ F:3:28(ASM)	Euro-American, mid-20th century	corral	Features: water tank, water troughs, fire ring, two-track road, fence Artifacts: approximately 31	2.9 acres
4	AZ F:3:29(ASM)	Euro-American, mid-20th century	corral	Features: fence, water pipe, water trough Artifacts: several wire fragments and metal fittings from burned water trough	1.7 acres
5	AZ F:3:30(ASM)	Euro-American, mid-20th century	livestock watering station	Features: water tank, water trough, wood pile, 10 push piles Artifacts: 6	0.5 acre
6	AZ F:3:38(ASM)	Euro-American, mid-20th century	road	Features: graded road Artifacts: none	7.0 miles long, 0.1 mile surveyed
7	AZ F:3:39(ASM)	Euro-American, circa 1950s	road	Features: graded road Artifacts: none	7.5 miles long, 0.2 mile (2 segments) in surveyed
8	AZ F:3:40(ASM) Temple Bar Back Road	Euro-American, mid-20th century	road	Features: graded road, abandoned road segment, graded area, cluster of hardware items, artifact scatter Artifacts: 800 (estimated)	8.5 miles long, 2.2 miles surveyed

Site Number, Name		Affiliation, Age	Site Type	Features, Artifact Counts	Site Size
9	AZ F:3:41(ASM)	Euro-American, mid-20th century	road	Features: graded road Artifacts: none	10.2 miles long, 0.5 mile (5 segments) surveyed
10	AZ F:3:42(ASM)	Euro-American, mid-20th century	road	Features: graded road Artifacts: none	1.8 miles long, 0.2 mile surveyed
Sites Not Subject to Impacts and Not Evaluated for National Register Eligibility					
1	AZ F:3:27(ASM)	Euro-American, 1920s to 1930s	historical trash scatter	Features: none Artifacts: 10 and 1 prehistoric potsherd	0.4 acre
2	AZ F:7:12(ASM)	Euro-American, late 19th to early 20th century	historical trash scatter	Features: abandoned road, trash dump Artifacts 3,000 (estimated)	1.3 acres
3	AZ F:7:15(ASM)	Euro-American, late 19th to early 20th century	historical trash scatter	Features: road, 2 rock piles Artifacts: 2000 (estimated), 1 prehistoric potsherd	6.3 acres
4	AZ F:7:16(ASM)	Euro-American, late 19th to early 20th century	historical trash scatter	Features: none Artifacts: 38	0.03 acre
5	AZ F:7:17(ASM)	Euro-American, late 19th to early 20th century	historical trash scatter	Features: none Artifacts 500 (estimated)	1.4 acres
6	AZ F:7:18(ASM)	Euro-American, late 19th to early 20th century	historical trash scatter	Features: rock ring, modern survey marker Artifacts: 200 (estimated)	0.5 acre
7	AZ F:7:19(ASM)	Euro-American, late 19th century	historical road	Feature: road Artifacts: none	4.4 miles long, 0.1 mile surveyed
8	AZ F:7:20(ASM)	Euro-American, mid-20th century	historical road	Features: road Artifacts: none	2.8 miles long, 0.1 mile surveyed
9	AZ F:7:21(ASM)	Euro-American, undated	rock features	Features: 2 rock rings, 1 rock stack Artifacts: none	less than 0.01 acre
10	AZ F:7:22(ASM)	Euro-American, late 19th century to modern	historical trash scatter	Features: remnants of small wood structure, 5 rock stacks, 3 mining claim markers, 2 pits with berms, berm, depression Artifacts: 21	2.3 acres
11	AZ F:7:24(ASM)	Euro-American, late 19th to early 20th century	historical trash scatter	Features: none Artifacts 16,000 (estimated)	19.7 acres
12	AZ F:7:25(ASM)	Euro-American, late 19th to early 20th century	historical trash scatter	Features: none Artifacts: 2,000 (estimated)	5.8 acres
13	AZ F:7:26(ASM) El Dorado Ferry/ White Hills Road	Euro-American, late 19th century	historical road	Feature: road Artifacts: none	4.2 miles long, 0.1 mile surveyed

AZ=Arizona
ASM=Arizona State Museum
NOTE: [1] These sites have been evaluated as eligible for the National Register under Criterion D for their potential to yield important information. Ongoing consultations with the State Historic Preservation Office and tribes could determine that these sites are eligible under additional criteria.

3.6.4 Traditional Cultural Resources and Other Cultural Resources Sensitive to Visual Impacts

Cultural resources that might be affected by visual impacts include protected or interpreted sites in national parks and monuments, historic sites, landmarks, and trails; properties listed in the National Register of Historic Places; Areas of Critical Environmental Concern (ACECs) designated by BLM to protect important cultural resource values; other cultural resources for which there is agency or public sentiment for protection in place; and traditional cultural resources. Traditional cultural resources are places associated with cultural practices or beliefs of a living community, are rooted in community history, and are important in maintaining the continuing cultural identity of the community.

BLM is consulting with 13 tribes regarding potential impacts on archaeological sites and traditional cultural resources (see Section 5.2.2.3 for a list of tribes). Representatives of five of those tribes (Hualapai Tribe, Fort Mojave Indian Tribe, Colorado River Indian Tribes, Yavapai-Prescott Indian Tribe, and Las Vegas Paiute Tribe) participated in meetings and field tours, and the Hopi Tribe provided comments by letters.

The records review identified one National Register-listed traditional cultural property within 20 miles of the Project Area (Table 3-14). The place, which is known as Gold Strike Canyon-Sugarloaf Mountain, is about 16 miles northwest of the Project Area near Hoover Dam. Consultations conducted in conjunction with construction of the highway bypass around Hoover Dam determined that this location has traditional cultural significance for the Southern Paiute, Mojave, Hualapai, Yavapai, Hopi, Zuni, and Navajo.

Table 3-14 Traditional Cultural Resources

	Name	Tribe	National Register Status	Distance from Project Area
1	Gold Strike Canyon–Sugarloaf Mountain	Southern Paiute, Mojave, Hualapai, Yavapai, Hopi, Zuni, and Navajo	listed in 2004	16 miles
2	Wi Knyimáya (Squaw Peak)	Hualapai	eligible, Criteria A and D	in right-of-way
3	Wi Hla'a (Senator Mountain)	Hualapai	eligible, Criteria A, B, and D	1.5 miles
4	Mat Kwata (Red Lake)	Hualapai	considered eligible for this analysis, Criteria A and D	17 miles

The Project Area is in the White Hills, which is within territory that the Red Rock Band of the Hualapai occupied during ethnohistoric times. (The current Hualapai Reservation is about 23 miles east of the Project Area.) The Hualapai referred to the White Hills, which are within the Red Rock Band territory, by various names including Qa'nyiwa:ja, Wi Knyim Sáva, and Wi Hla'a (Moon Mountain), with the latter also being a name for Senator Mountain. Traditional stories recount how the Hualapai people traveled from their place of spiritual origin at Spirit Mountain (in southern Nevada) and then stayed at a spring in the White Hills before traveling on to Mađwiđa Canyon (a tributary of the Colorado River on the current Hualapai Reservation). Springs were important places of Hualapai habitation and gardening. A traditional Hualapai story recounts how Eagle Man and Eagle Woman lived together in the hills until they moved to other places after domestic discord (Bungart 2013). No springs have been identified in or near the Project Area and no archaeological evidence of Hualapai habitation sites was found in the Project Area.

The Salt Songs are a series of sacred songs sung to help the dead find their way to the afterlife. The songs describe a physical and spiritual landscape that encompasses northwestern Arizona, southern Utah, southeastern Nevada, and southern California. The song cycle is an important part of Southern Paiute traditional culture but was adopted by many other tribes, including the Hualapai. One part of the song cycle describes a journey by two birds from the Colorado River, at approximately the current location of Blythe, California, to salt caves north of the big bend of the Colorado River. That route is likely to have followed the Detrital Valley through the Red Rock Band traditonal territory.

The Red Rock Band traditionally hunted rabbits, antelope, and mountain sheep and gathered food plants in the White Hills and Detrital Valley. The Hualapai used more than 50 species of plants for food, fiber, medicine, and other purposes. Culturally important plants within and near the Project Area include wild tobacco, various wild grains, and banana yucca. Mountain slopes, hills, and caves were used as burial grounds. For centuries, the Hualapai hunted and gathered food and occupied winter camps in the Cerbat

Mountains southeast of the Project Area. Those mountains also were a battleground of the Hualapai and the U.S. Army during the 1860s when mining activity increased in the area. The Hualapai held a Ghost Dance in the Cerbat Mountains around 1890 in an attempt to restore a traditional way of life that they had pursued before non-Natives arrived and took over Hualapai territory. During the reservation era, many Hualapai learned ranching skills when they were employed at Anglo-owned ranches in the vicinity of the Cerbat Mountains.

The Hualapai Tribe identified two traditonally significant mountain peaks in and near the Project Area (refer to Table 3-14). Traditional Hualapai consider mountain peaks to embody powerful spirits and shamans conducted ceremonies on mountains to acquire curing powers and to send prayers across the landscape (Bungart 2013; Kroeber 1935). Oral history indicates that Wi Knyimáya (Squaw Peak), which is in the northwestern part of the Project Area, has traditional cultural significance and the Hualapai used the area as a burial ground, but no physical evidence of burials has been identified. Wi Hla'a (Senator Mountain), which is about 1.5 miles east of the Project Area, is associated with the Hualapai shaman who was known as Indian Jeff, as well as with Wassa Yuma, the last leader of the Red Rock Band. Oral history indicates that Hualapai also interred burials near the peak but no physical evidence of burials has been identified.

The BLM, in consultation with the Hualapai Tribe and SHPO, determined that Wi Knyimáya (Squaw Peak) and Wi Hla'a (Senator Mountain) are is eligible for the National Register for their association with traditional Hualapai culture (Criterion A) as well as for the potential of future research to yield important traditional cultural information (Criterion D). Wi Hla'a (Senator Mountain) also is considered eligible for its associations with the last leader of the Red Rock Band, Wassa Yuma, and the important Hualapai shaman, Indian Jeff (Criterion B).

Mata Thi:ja, a small cave where the Hualapai Red Rock Band gathered salty earth, is another traditional Hualapai cultural resource that may be within the Project Area, but documentation about the cave is ambiguous. The Hualapai Tribe identified a location in the southern part of the Project ROW that they believe is in the general vicinity of Mata Thi:ja, but no cave was found in the area and and its location has not been confirmed (Bungart 2013).

Mat Kwata (Red Lake) is another traditional Hualapai cultural resource that was previously identified and is considered eligible for the National Register. Red Lake, an ephemeral playa in Hualapai Valley about 17 miles southeast of the Project Area, was a source of water when rainfall runoff was sufficient to reach the valley floor. The Red Rock Band shared the harvests of seedy plants that grew around the playa with other Hualapai bands, and probably hunted game when the playa held enough water to attract wildlife.

Other consulted tribes expressed similar concerns about the cultural landscapes of interconnected places within their traditional territories along the Colorado River. Traditional stories and songs of tribal and clan origins and histories give cultural and spiritual values to those landscapes. Traditional tribal peoples often attribute a conscioiusness to the natural world, and stated that their ancestors respected the animal and plant resources that occupied their traditional territories, and it is important to continue protecting those resources. Several tribal representatives expressed concerns about the potential for expansive renewable energy projects to directly and indirectly affect those traditional cultural landscapes and alter or restrict access to important cultural places. The Hopi Tribe expressed special concerns about potential impacts on raptors.

Other cultural resources that might be affected by visual impacts outside the Project Area were identified in conjunction with the assessment of potential visual impacts on landscape character and scenic quality out to a distance of 20 miles. Those cultural resources were identified by reviewing the Kingman RMP (BLM 1995) and maps of northwestern Arizona and southern Nevada, and consulting with agency cultural resource specialists. In addition to the eight identified traditional cultural resources, eight other cultural resources sensitive to potential visual impacts were identified (Table 3-15).

Table 3-15 Cultural Resources Sensitive to Potential Visual Impacts (within 20 Miles)

	Resource	Description	Distance from Project Area
1	historic White Hills townsite and cemetery	site of silver mining community, circa 1892 to 1902, few remnants left, cemetery on public land; not formally evaluated for National Register eligibility but considered eligible under Criterion D for this analysis	2 miles
2	Black Mountains Ecosystem Management ACEC	desert bighorn sheep habitat and wild burro management area, numerous archaeological sites, including rockshelters (including Bighorn Cave), campsites, pictographs, and mining cabins; not formally evaluated for National Register eligibility but considered eligible under Criteria A, C, and D for this analysis	5 miles
3	Temple Bar Mission 66 Facilities	example of mid-twentieth-century National Park Service program to upgrade facilities; the National Park Service is evaluating the National Register eligibility of the Mission 66 facilities and they were considered eligible under Criteria A and C for this analysis	7 miles
4	Petroglyph Wash	concentration of petroglyphs in canyon of Colorado River tributary within the Lake Mead National Recreation Area; not formally evaluated for National Register eligibility but considered eligible under Criteria C and D for this analysis	10 miles
5	Joshua Tree-Grand Wash Cliffs ACEC	densest stand of Joshua trees in Arizona and 10 miles of scenic 2,000-foot-high cliffs, numerous archaeological sites (many with roasting pits); not formally evaluated for National Register eligibility but considered eligible under Criterion D for this analysis	12 miles
6	Willow Beach Gauging Station	built in 1934-1935 and operated to 1939 to measure river flows below Hoover Dam, listed in National Register in 1986	12 miles
7	Old Spanish National Historic Trail	trail used for trade between Mexican settlements in northern New Mexico and southern California, circa 1829 to 1840s; trail in Nevada listed in National Register as district in 2001 (Criteria A and D) but segment in Project vicinity not contributing element	16 miles
8	Hoover Dam National Historic Landmark	massive concrete arch-gravity dam built between 1931 and 1936; listed in National Register and designated a National Historic Landmark in 1985	17 miles

NOTE: ACEC = Area of Critical Environmental Concern

Remnants of the abandoned White Hills townsite are about 2 miles south of the Project Area. Most of the townsite and adjacent mines are on private land but an associated cemetery is on public land adjacent to the townsite.

The Old Spanish National Historic Trail originated as the route that the merchant Antonio Armijo followed in 1829 to lead a caravan of about 60 men and 100 mules from Mexican settlements in northern New Mexico to missions in California. The closest segment of Armijo's original route down the Virgin River valley to the Colorado River is about 16 miles north of the Project Area in the Lake Mead NRA but it is inundated by Lake Mead.

There are NPS "Mission 66" facilities at Temple Bar in the Lake Mead NRA about 7 miles north of the Project Area. Mission 66 was a mid-twentieth-century NPS program to expand staff and upgrade deteriorating park facilities to meet the needs of increased visitation of the national parks. The 10-year Mission 66 program was completed in 1966—the fiftieth anniversary of the founding of the NPS—and Mission 66 facilities are considered a milestone in the agency's history. Petroglyph Wash, located in the Lake Mead NRA area more than 10 miles northwest of the Project Area, has a significant concentration of petroglyphs pecked on canyon walls.

The BLM designated the Joshua Tree–Grand Wash Cliffs ACEC primarily to protect the densest stand of mature Joshua trees in Arizona and the scenic qualities of about 10 miles of the 2,000-foot-high Grand Wash Cliffs. Numerous prehistoric archaeological sites have been found in the area and protection of those resources for scientific and educational purposes was a secondary reason for designating the ACEC. At its closest, the Joshua Tree–Grand Wash Cliffs ACEC is about 12 miles east of the Project Area.

BLM designated the Black Mountains Ecosystem Management ACEC primarily because it is outstanding desert bighorn sheep habitat and also includes the Black Mountain Wild Burro Herd Management Area. The ACEC also provides protection for a variety of cultural resources, including Bighorn Cave (which is listed in the National Register), other prehistoric rockshelters, campsites, and pictographs, and remains of some of the oldest Euro-American mining cabins in Mohave County. The cultural resources in the ACECs are primarily significant for their potential to yield information, which would not be affected by visual impacts. At its closest, the northern edge of the Black Mountains Ecosystems Management ACEC is about 5 miles southwest of the Project Area.

Hoover Dam, which was built between 1931 and 1935, was designated a National Historic Landmark in 1985. The dam is about 17 miles northwest of the Project Area. The National Register-listed Willow Beach gauging station, built in 1934 and operated until 1939 in conjunction with the construction of Hoover Dam, is about 16 miles west of the Project Area.

3.6.5 Indian Trust Assets

Indian trust assets are legal interests in property held in trust by the United States for Indian tribes or individuals. The Secretary of the Interior, acting as the trustee, holds many assets in trust. Examples of trust assets are lands (including tribal trust, fee title, and allotted lands); minerals; hunting and fishing rights, and water rights. While most Indian trust assets are on reservations, they may also be found off-reservations. The United States has a trust responsibility to protect and maintain rights reserved for or granted to Indian tribes or Indian individuals by treaties, statutes, and executive orders. These are sometimes further interpreted through court decisions and regulations. Consultation with the Bureau of Indian Affairs confirmed that there are no Indian trust assets in the Project Area.

3.7 PALEONTOLOGICAL RESOURCES

3.7.1 Introduction

The paleontological setting and assessment for the proposed Project were based on a review of data gathered from the Arizona Geological Survey, USGS, the Arizona Museum of Natural History (AzMNH), and paleontological and geologic literature. Dr. Pat Hester, regional paleontologist with the BLM Albuquerque District Office, was consulted. No site visit was made. The study area considered for the paleontological analysis is the same as the Project Area as defined in Chapter 2.0 of this EIS.

3.7.2 Regional Overview

The study area lies between the Basin and Range province and the Colorado Plateau. The Colorado Plateau endured the Cenozoic without disruption, but the Basin and Range Province underwent extreme attenuation. The area between the two has been termed the northern Colorado River extensional corridor (Faulds et al. 1990). It is characterized by detachment faulting, and the South Virgin-White Hills detachment fault snakes along its length. Magmatization in the area began 20 to 18 million years ago; east-west extension occurred from 16 to 8 million years ago (Faulds et al. 2008). Cenozoic volcanic and sedimentary rocks filled the White Hills Basin before it was disrupted by the South Virgin-White Hills detachment fault. As much as 10.7 miles (17 kilometers) of Proterozoic metamorphic rock now separate the north and south basin segments. The basin segments now constitute areas of east-dipping volcanic and sedimentary rocks. The igneous and sedimentary rocks of the northern and southern segments of the

White Hills Basin together with the intervening metamorphic rocks make up the White Hills. Middle Miocene to Quaternary basin fill sediments overlie these in some areas.

3.7.3 Existing Conditions

The proposed Wind Farm Site lies within the northern White Hills, between Detrital Valley to the west and Hualapai Valley to the east. It lies within townships T28N, R19W, T28N, R20W, T29N, R19W, and T29N, R20W. These are found on the Senator Mountain, Senator Mountain SW, Senator Mountain NE, and Senator Mountain NW USGS, 7.5 minute topographic maps.

3.7.3.1 Geologic Setting

Wilson and Moore (1959) mapped the area as part of their mapping of Mohave County geology. Faulds et al. (2008) mapped it in their study of the boundary area between the Colorado Plateau and the Basin and Range province. The White Hills predominantly consist of Tertiary aged sedimentary and igneous rocks, along with Proterozoic metamorphic rocks. One granitic intrusion is also present to the southwest of the Project. The Tertiary sedimentary rocks predominantly consist of sandstone, mudstone conglomerates, and unconsolidated sediments (sands and gravels). These sedimentary units generally outcrop at the lower elevations within the White Hills. None of the published maps assign formational names to these geologic units. Holocene to latest Pleistocene formations found in the Project Area are known to be fossiliferous elsewhere; however, no fossils have been recorded in the Project Area and no paleontological field survey has been completed in the Project Area. If fossils are found during ground disturbing activities, mitigation measures would be implemented.

3.7.3.2 Paleontological Resources

A search was made for pertinent information on paleontological resources in available geological and paleontological literature. A paleontological records search from the Arizona Museum of Natural History was conducted to extend 1 mile beyond the Wind Farm Site.

3.7.3.3 Literature Search Results

A search of geologic and paleontological literature yielded no records of paleontological resources within the Project Area. Works consulted include Lindsay and Tessman (1974), Lucas and Morgan (2005a and b), Mead (2005), Meade et al. (2005), and Morgan and White (2005). The current geological conditions associated with the access road are similar to those of the Wind Farm Site within the Project Area.

3.7.3.4 Paleontological Records Search Results

The results of the paleontological records search were provided by Dr. Robert McCord (2010). He found evidence of 15 vertebrate paleontological localities within Mohave County. Dr. McCord reported that the Arizona Museum of Natural History, the Museum of Northern Arizona, the Northern Arizona University Quaternary Studies Program collections, and the collections at the University of Arizona have no evidence of paleontological sites within 10 miles of the Project Area.

3.8 LAND USE

3.8.1 Introduction

This section discusses existing regional and Project Area land use (including special management areas), recreation, livestock grazing, and access route ROWs.

Regional and Project Area data were collected from published literature reviews, online research, and coordination with the BLM and Reclamation. There were no field surveys conducted. The study area considered for the land use, recreation, and livestock grazing analysis is the same as the Project Area as defined in Chapter 2.0 of this EIS.

3.8.2 Regional Overview

Within northwestern Arizona in Mohave County, land is managed by BLM, Reclamation, NPS, State Trust, and private land owners (Map 3-8, Land Use). Mohave County encompasses 13,286 square miles with approximately 2,485 square miles under private ownership (Mohave County 2011). Federal agencies administer 68.7 percent of the land within the county, Indian reservations 6.7 percent, and the State of Arizona 6.6 percent. Much of the public land managed by the BLM Kingman Field Office (KFO) is characterized by large areas of intermingled ownership. Mohave County includes diverse communities and development ranging from urban to rural (Arizona Department of Commerce 2008).

The nearest communities to the Project Area include White Hills, Arizona (located approximately 5 miles south), Dolan Springs, Arizona (located approximately 15 miles south which are both within unincorporated Mohave County). Other more distant communities include the City of Kingman, Arizona (located approximately 37 miles southeast), Boulder City, Nevada (located approximately 37 miles west) and Henderson, Nevada (located approximately 40 miles northwest).

3.8.2.1 Land Use Plans Applicable to the Project and Surrounding Area

The Project Area is located within the BLM Kingman Resource Area and is managed by the BLM KFO under the jurisdiction of the Kingman Resource Area Resource Management Plan approved by the Record of Decision dated March 7, 1995 (the Kingman RMP) (BLM 1995). The KFO oversees more than 2.4 million acres of public land in Mohave and Yavapai Counties in northwestern Arizona located south and east of the Colorado River, south of Lake Mead and south of the Hualapai Indian Reservation. The Kingman RMP contains decisions for managing public lands and resources administered by the BLM in the Kingman Resource Area. The Resource Management Plan guides the management of public lands, associated resources and diverse multiple uses on the resource area over a 20 year time period. The RMP does not have any specific management plans or special land use designations in the Project Area. Management plans for livestock grazing and recreation in the Project Area are described in Sections 3.8.4.2 and 3.8.4.3.

After BP Wind Energy had filed an application for the Mohave County Wind Farm Project, the Arizona BLM initiated a separate planning process for renewable energy projects in 2010. The goal of the Restoration Design Energy Project (RDEP) was to involve the public, through a NEPA planning process, in the identification of public lands administered by the BLM that would be most suitable for renewable energy development. Renewable Energy Development Areas (REDAs) were identified based on the availability of low conflict public lands where environmental constraints, such as sensitive habitat, known cultural resource sites, unstable soils, and steep slopes were not present. Additional factors, including distance to transmission lines and water availability for project construction and operation, were considered in the identification of REDAs. The planning process for the Restoration Design Energy Project also considered the opportunity to develop renewable energy projects in locations where there had been prior disturbances or contamination that might make the land less suitable for other uses.

Approximately half of the proposed Mohave County Wind Farm Project Area overlaps with a REDA, as defined by the RDEP. Development within a REDA does not preclude the need to prepare project-specific NEPA documentation nor does development outside of a REDA indicate that the area is unsuitable for renewable energy. However, the process did offer an additional opportunity for public input in locating future renewable energy projects including the REDA identified within the Mohave County Wind Farm Project Area. The Final EIS for the Restoration Design Energy Project was issued in October 2012 and in January 2013, BLM issued a Record of Decision and RMP Amendments. The Kingman Resource Area RMP (BLM 1995) was one of eight Arizona RMPs that was amended to implement the goals, objectives, management actions, land use allocations, design features, and BMPs identified by the selected alternative, Alternative 6: Collaborative-Based REDA, to administer the development of renewable energy resources on BLM-administered public lands in Arizona.

The Project Area is located within Reclamation's Lower Colorado Region and is managed by Reclamation under the guidance of Policies, and Directives and Standards. The Lower Colorado Region covers an area of nearly 202,000 square miles, and encompasses parts of five states that contribute water to or draw water from the Colorado River. Reclamation manages the Colorado River and its reservoirs to meet water and power delivery obligations, protect endangered species and native habitat, support outdoor recreation opportunities, and provide flood control. Reclamation has management plans in place where resource issues and allocation decisions warrant. The Project Area is not subject to such a plan.

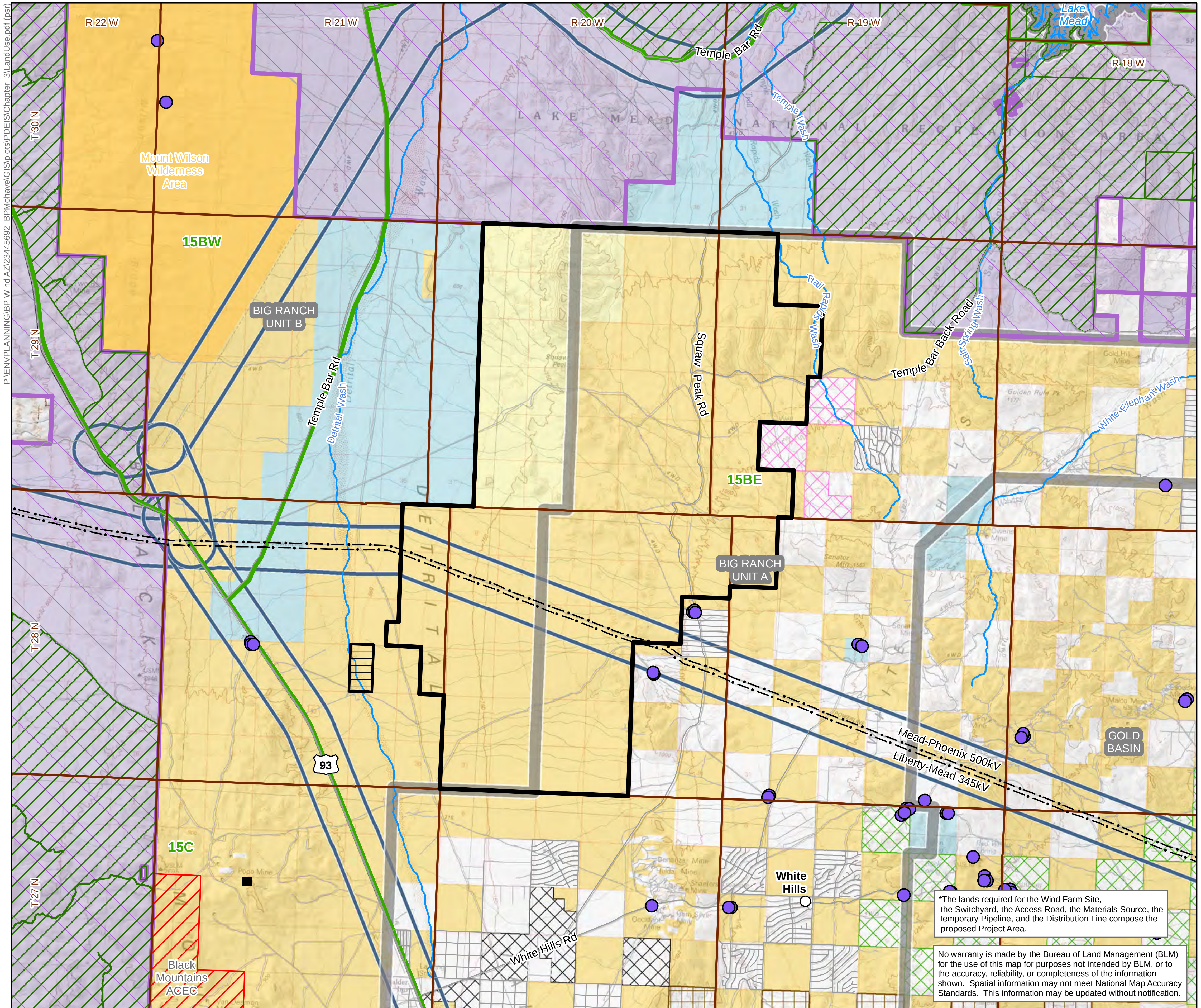
The Lake Mead National Recreation Area (NRA) General Management Plan (GMP) was approved in 1986 and provides a general framework to guide future NPS management decisions for the NRA. The GMP analyzes the fundamental resources that are critical to achieving the NRA purpose and maintaining its significance, describing specific desirable resource conditions and visitor use goals. The Lake Mead NRA GMP focuses on accommodating increasing visitor use while protecting the area's most outstanding cultural and natural resources. The GMP was amended in 2005 to provide additional and more specific guidance for the long-term management of Lakes Mead and Mohave. The GMP does not provide any specific management guidance or requirements for the Project Area or NPS-managed lands immediately adjacent to the Project Area. The NPS Lake Mead GMP states that "the National Park Service will work with the Bureau of Land Management to ensure protection of natural and scenic values on these adjacent Federal lands" (NPS 1986).

The Arizona State Land Department has not established a specific land use management plan for State Trust land in the vicinity of the Project, but they do have goals, policies, and programs in place to manage and provide support for resource conservation programs for the well-being of the public and the State's natural environment including recreation and livestock grazing.

Private lands in the vicinity of the Project Area are under the jurisdiction of Mohave County and are subject to the policies set forth in the Mohave County General Plan. The Mohave County General Plan consists of existing and anticipated conditions affecting the county, establishes goals, policies and implementation measures that guide the counties future actions, and describes actions to take to achieve the counties desired future. The county's general plan is intended to provide a clear understanding of the development patterns the community has found to be most appropriate. As such, it sets forth the policies that will guide the county's review of individual development proposals. The Mohave County General Plan was originally adopted in 1965 and was reassessed and revised in 1995, 2005, and 2010. The Mohave County Board of Supervisors approved an amendment to the Mohave County General Plan on August 6, 2012, changing the land use designation of the Project Area from Rural Development Area (RDA) to Rural Development Area, Alternative Energy (RDA, AE). The Project Area was rezoned from A-R/36A (Agricultural Residential/thirty-six acre minimum lot size) to add an E-W (Energy Overlay-Wind) zone so that the wind farm site would be in conformance with the county plan.

Map 3-8
Land Use

Mohave County Wind Farm Project



Legend

- Wind Farm Site*
- Materials Source
- National Park Service Lake Mead National Recreational Area Boundary
- Bureau of Land Management Area of Critical Environmental Concern (ACEC)
- National Park Service Proposed Wilderness
- Bureau of Land Management Grazing Allotment
- Arizona Game and Fish Department Game Management Unit
- Utility Corridor
- Communication Tower
- Rangeland Improvement

Planned Development Communities

- The Ranch at Red Lake
- The Ranch at Temple Bar
- The Ranch at White Hills and Mardian Ranch
- The Villages of White Hills

Proposed Renewable Energy Project

- Table Mountain Solar Energy

Surface Management

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- State Trust Land
- Private Land
- Bureau of Land Management Wilderness Area

General Features

- Community
- Existing Transmission Line
- Wash
- U.S. Highway
- Road
- Township and Range Boundary
- Lake

Source:
Project Area Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Renewable Energy Project: BLM 2011
Utility Corridor, Lands, ACEC: BLM 2009
Base: ALRIS 1997-2008, BLM 2009
Grazing Allotments, Range Featrues: BLM 2009
Lake Mead Recreation Boundary, Potential: National Park Service, 2009
Base topographic data created with Copyright:© 2011 National Geographic Society, i-cubed

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The Land Use Element of the Mohave County General Plan supports the efficient use of public and private resources by promoting urban growth in areas where infrastructure is already in place or in close proximity. The pattern of development described by the general plan reduces the potential for locating incompatible land uses adjacent to one another. The goals, policies and implementation measures of the plan provide guidance for ensuring land use compatibility.

The following goals and policies from the Energy Section of the Mohave County General Plan could be applicable to proposed alternative energy facilities:

> **Goal 6**: To encourage the efficient use of alternative energy sources by residential and nonresidential users.
>
> - **Policy 6.1** The County should support the voluntary use of alternative energy through its subdivision, zoning and building regulations.
> - **Policy 6.2** The County should support the use of alternative energy.
> - **Policy 6.3** The County should work with local utilities to explore opportunities to encourage the use of alternative energy.
> - **Policy 6.4** The County should support and encourage the development of beneficial alternative energy production facilities in conducive locations, that are consistent with any existing adjacent development, and the community in which the facilities will be located.

3.8.3 Regional Land Use

3.8.3.1 Residential and Commercial Uses

There are several proposed land development projects in the region. These projects include planned communities for the Ranch at White Hills and Mardian Ranch, and the Villages of White Hills (see Map 3-8). The Ranch at White Hills and Mardian Ranch is a proposed master planned area encompassing 25,360 acres of privately owned lands in and around the White Hills area of Mohave County, Arizona. The Ranch at White Hills and Mardian Ranch is composed of four distinct planning group properties: The Ranch at White Hills (6-10 dwelling units/acre [du/ac]), The Ranch at Temple Bar (3-5 du/ac), The Mardian Ranch and Ranch at Red Lake (3-5 du/ac), and the Table Mountain Renewable Energy properties. The Ranch at White Hills development also identifies 80 acres of proposed commercial development at White Hills Road and US 93, and further site-specific commercial development property along Pierce Ferry Road (Arizona Acreage, LLC 2004). The Village at White Hills is a planned 2,727-acre community with commercial, recreation, and open space uses. The community, as proposed, would include more than 20,000 dwelling units spread across four distinct villages with their own village center which include residential densities of 5 du/ac, 12 du/ac, and 25 du/ac. This project also proposes to include commercial development at the entrance to the community along US 93, as well as 150 acres of dedicated parks and open space.

In addition to the land development projects in the region, there are a small number of homes on larger lots located in Dolan Springs. Private property located south of the Wind Farm Site consists of lots that are at least 5 acres in size or larger. Section 3.10 provides the population densities and demographic information for this area.

3.8.3.2 Utility Uses

Utility corridors in the region include three existing transmission lines, two 500-kV lines and a 345-kV line. The 500-kV Moenkopi-El Dorado line is located south of the Project Area. Two parallel Western

Area Power Administration (Western) transmission lines (500-kV and 345-kV) with an east-west orientation are located north of White Hills, Arizona, and pass through the southern portion of the Project Area (see Map 3-8). In addition, there are three proposed transmission lines in the immediate vicinity of the Project Area. An approximately 900-mile overhead, high-voltage direct current transmission line from northeast New Mexico to southern California is being proposed by Clean Line Energy Partners. One corridor under consideration is located south of the Project Area and north of Kingman. A 500-kV transmission line is planned to parallel the existing Moenkopi-El Dorado line, south of the Project Area, to be owned and operated by the Navajo Tribal Utility Authority. The West-wide Energy Corridor Programmatic EIS has proposed a 500-kV transmission line to parallel the existing Western 500-kV and 345-kV transmission lines north of White Hills in the southern portion of the Project Area.

There are numerous communications facilities on public lands in the region, most consisting of specific use facilities to serve linear ROWs, such as pipeline and powerline control operations or cellular telephone relays. Eleven mountaintop communication sites have been designated in the region. The three sites located closest to the Project Area include Senator Mountain to the southeast, Patterson Slope to the east, and Willow Beach to the west. All three of these nearby sites are electric communication sites (BLM 1995).

3.8.3.3 Mining Uses

There are several closed mine sites, prospect sites, and other mineral features in the region. The area with the most mining activity is southeast of the center of the Project Area in the White Hills Mineral District (see Map 3-4). This area contains approximately 20 closed mines and one prospect site that have been mined primarily for gold and silver. The Project is within an area of low favorability for mineral mining. The Project Area is not in a mining district and there are no active mining claims within the proposed Project Area.

3.8.3.4 Aviation Uses

Triangle Airpark is located 0.5 mile northeast of White Hills Road and US 93. The airport has two runways (one asphalt and one dirt) and is privately owned by Boulder City Aero Club Inc. The airport is available for private use only. The Federal Aviation Administration (FAA) visual flight rule restricts the use of the airpark to day use only.

3.8.3.5 Special Management Designations

Special management designations provide additional protection for areas with unique natural, historic, scenic, or recreational resources. BLM special designations can include National Monuments, National Conservation Areas, ACECs, Wilderness Study Areas, Back Country Byways, National Historic or Scenic Trails, Wilderness, and Wild and Scenic Rivers. Wilderness Study Areas and ACECs are BLM administrative designations, while the other special designation areas are created by presidential proclamation or an act of Congress.

The Route 66 National Back Country Byway begins 5 miles south of Kingman, approximately 40 miles south of the Project Area. The Joshua Tree Forest/Grand Wash Cliffs ACEC, designated to protect unique vegetation and scenic values, is located east of the Project Area. The Black Mountains ACEC, designated to protect big horn sheep, wild burro habitat, and cultural resources, is located to the southwest, and Lake Mead NRA is located to the north. The Cerbat Foothills Recreation Area Trail System, located approximately 10 miles northwest of Kingman, is a cooperative effort between the BLM, AGFD, and the City of Kingman. The area is managed for recreational purposes, which includes hiking, mountain biking, and horseback riding. There are no Special Recreation Management Areas (SRMAs) located in the region.

An inventory evaluating the presence or absence of wilderness character on BLM-administered lands was completed in 1980 which determined that wilderness character was absent in the Project Area. The wilderness characteristics inventory maintenance completed in July 2010 also found that wilderness characteristics are not present on BLM-administered lands in the Project Area (Fuselier 2010). Based on the analysis, BLM determined that the 1980 inventory findings indicating that BLM-administered lands within the Project Area do not possess wilderness character remains valid. A survey was not completed for lands administered by Reclamation because Reclamation does not manage for wilderness characteristics. As such, wilderness character of the Project Area will not be further analyzed in this EIS.

3.8.3.6 Wilderness and Proposed Wilderness Areas

The 23,900-acre Mount Wilson Wilderness Area is located approximately 20 miles northwest of the Project Area on lands administered by BLM. The area, encompassing 8 miles of Wilson Ridge, contains a diverse landscape of mountains, desert, mesas, cliffs, and badlands. Several springs found in the area support a variety of wildlife, including a population of desert bighorn sheep. Approximately 4 miles north and 1 mile east of the Project Area, Lake Mead NRA contains areas that NPS proposed as wilderness in 1979 (see Map 3-8, Land Use). Temple Bar Back Road and Temple Bar Road provide vehicle access into these areas. Recreation opportunities in the wilderness area and proposed wilderness area include wildlife viewing, hunting, hiking, primitive camping, backpacking, and horseback riding.

3.8.3.7 Recreation

Located in the Mojave Desert, the region offers a wide variety of recreational experiences and opportunities due to the topography, terrain, vegetation, scenic values, historic resources, wildlife, wilderness, and riparian resources. The area is in a transition between the Basin and Range and the Colorado Plateau physiographic provinces (BLM 1995) and contains the Black, Cerbat, Haulapai, McCracken, and Aquarius mountains. Scenic features are diverse in topography and include the Grand Wash Cliffs, Cerbat Pinnacles, Squaw Peak, Pilot Knob, Senator Mountain, Mount Nutt, and the Hualapai Mountains. A wide variety of recreational pursuits including camping, backpacking, horseback riding, hiking, rockhounding, off-highway vehicle (OHV) use, hunting, recreational target shooting, fishing, and wildlife viewing take place within the region. While there are no designated horse or hiking trails within the Project Area, there are two-track trails that are considered primitive roads. Regional helicopter tours, which generally originate in Las Vegas, include sight-seeing flights to the Grand Canyon and Lake Mead RNA; some of these flights pass over the Project Area. Recreation opportunities exist in remote areas and designated areas (i.e., campgrounds, wilderness areas, recreation areas). Mohave County contains numerous Federal, State, and local parks and recreation areas within the region.

Special Recreation Permits (SRPs) are BLM-granted land use authorizations that allow specified recreational uses of public lands. There are five types of recreation uses in which BLM would require an SRP; commercial use, competitive use, vending, special area use, and organized group activity and event use. In the KFO, from 2007 to 2011, an average of 6 commercial and competitive SRPs were issued each year (Table 3-16) (BLM 2012). Commercial permits were issued for hunting outfitter and guide services and a competitive use permit was issued in 2009 for a motorized event.

Table 3-16 Special Recreation Permits Issued in the BLM Kingman Field Office

	2007	2008	2009	2010	2011
Commercial Permits	3	5	6	7	8
Competitive Use Permits	0	0	1	0	0
Total	3	5	7	7	8

SOURCE: Bureau of Land Management 2012

Reclamation issues Reclamation Recreation Purpose Licenses to individuals, groups of individuals, profit or nonprofit organizations, or commercial operators that grant permission to use lands under the jurisdiction of Reclamation for recreation purposes beyond those normally provided to the general public. The last Reclamation Recreation Purpose License issued by Reclamation in the region was in 2009 for the Colorado River Heritage Greenway Park and Trails.

Managed by the NPS, Lake Mead NRA is identified as a designated recreation area which provides primitive and non-primitive recreation opportunities (see Map 3-8). The Lake Mead NRA includes two reservoirs and covers approximately 1.5 million acres of land. It is characterized by a contrast of desert and water, mountains and canyons, and primitive backcountry and public marinas. Recreation opportunities are diverse within the recreation area and include hiking, boating, horseback riding, fishing, hunting, kayaking, swimming, camping, scuba diving, wildlife viewing, biking, and picnicking. The Lake Mead NRA estimates that more than 7.3 million persons visit the recreation area annually (Holland 2012).

Numerous roads provide access to Lake Mead NRA, including Temple Bar Road, which branches off from U.S. 93. According to the Mohave County Public Works Traffic Count, 123 vehicles were recorded using the Temple Bar Road per day. The count period was between October 26, 2010 and November 2, 2010 (Mohave County Public Works 2010). This count was not taken during summer, which is the high use season of Lake Mead NRA, and may not present a fully accurate representation of yearly use of Temple Bar Road. Traffic data on certain roads within Lake Mead NRA are also maintained by NPS. Based on the traffic counts, NPS estimates that about 81,000 visitors entered Lake Mead NRA via Temple Bar Road in 2009 and about 68,000 visitors used this road in 2010 (Holland 2012). Therefore, of the approximately 7.3 million visitors, approximately 1 percent of the visitors use Temple Bar Road for access.

Although there are no formally established trails in the vicinity of the Project Area near the Lake Mead NRA, there are a number of approved backcountry roads that provide access to the park. In addition, there are designated campsites identified in the park's Backcountry Management Plan at the intersection of Temple Bar Road and Salt Spring Road; Salt Spring and Gregg's Hideout. Based on traffic count data, NPS estimated that in 2010 approximately 2,500 people per year travel on Temple Bar Backcountry Road. This is based on the number of vehicles counted on AR 134 (backroad to Gregg's Hideout) which is a road similar to Temple Bar Back Road. (See Section 3.9 for traffic count data.) Visitor activity in the area is primarily day use.

Mohave County Parks Department manages four community parks in the region and three special use parks, all outside of the Project Area. The community parks, including Mt. Tipton, Veteran's, Neal Butler, and Chloride, range in size from 1 acre to 18 acres and provide recreation opportunities including picnicking, walking, and athletic activities. The closest park, Mt. Tipton Community Park, is located approximately 15 miles south of the Project Area in Dolan Springs on Pierce Ferry Road just east of US 93. Approximately 6 acres in size, the park offers a lighted ramada with picnic tables, a pit barbecue, horseshoe pits, baseball diamond, basketball court, and a playground area for children.

The Mohave County special use parks include Hualapai Mountain Park and Davis Camp. These parks provide additional recreational opportunities within the region of the Project Area. The approximately 2,300-acre Hualapai Mountain Park is located more than 45 miles from the Project Area. Recreation opportunities include hiking, camping, backpacking, picnicking, OHV use, mountain biking, and horseback riding. Davis Camp is also located more than 45 miles from the Project Area and provides opportunities for picnicking, camping, boating, fishing, target shooting, and athletic activities (Mohave County 2010).

The City of Kingman, located approximately 37 miles south of the Project Area, manages 13 parks ranging in size from 2 acres to 51 acres. Recreation activities at City of Kingman parks include picnicking, walking, and athletic activities.

Other recreation areas in the project vicinity include the Hoover Dam to the north and Colorado River Heritage Greenway Park and Trails to the south. These recreation areas and facilities provide diverse recreation opportunities such as boating, camping, OHV use, fishing, hunting, wind-surfing, sailing, picnicking, wildlife viewing, hiking, swimming, and sightseeing.

3.8.3.8 Livestock Grazing

Historic livestock grazing practices in northwest Arizona, including within the region, are similar to those employed in the northwest and southwest U.S. prior to the mid-twentieth century. Enactment of the Taylor Grazing Act of 1934 provided parameters for livestock grazing in the form of grazing allotments, regulation of number and type of livestock (i.e., cattle, sheep, horses), and season of use. BLM uses monitoring studies and rangeland health assessments to determine if proper grazing management will meet public land health standards as outlined in the *Arizona Standards and Guidelines for Rangeland Health* (BLM 1997).

Grazing permits are required for livestock use on public lands. Permits are generally authorized for 10 years and outline terms and conditions for annual grazing utilization. Grazing allocations in terms of animal unit months (the amount of forage needed to sustain one cow, five sheep, or five goats for a month), season of use, and number and type of livestock are among the mandatory terms and conditions put forth in each permit. Other terms and conditions include methods to meet management objectives. Annual adjustments to a grazing system are possible if the livestock operator (permittee) has met the terms and conditions of his/her permit.

Grazing allotments on public lands in the region are classified according to the type of forage available for livestock. Two classifications are used: perennial and ephemeral. Perennial forage is available consistently each year through perennially producing grasses, forbs, and shrubs. Ephemeral forage consists of annual grasses and forbs that become productive only in response to adequate spring moisture and warm temperatures. On ephemeral allotments, grazing is authorized only when ephemeral forage is abundant. All grazing allotments in Mohave County are designated as perennial or ephemeral. Forage availability in the allotments is both ephemeral and perennial and most ranching operations on public land in the region are yearlong cow-calf enterprises.

Rangeland improvement projects have been constructed throughout the region to improve livestock grazing. Rangeland improvements such as springs, wells, storage tanks, and rain catchments have been developed in the region to provide water for livestock and wildlife. Rangeland improvement features in Big Ranch Unit A include unfenced reservoirs, troughs, windmills, and livestock fencing, none of which are located within the Project Area. Big Ranch Unit B range features include a trough, storage tank, and two developed springs (see Map 3-8). There are no rangeland improvement projects located on Reclamation-administered lands in Big Ranch Unit B.

3.8.4 <u>Project Area Overview</u>

This section describes the existing land use, recreation, and livestock grazing conditions within the limits of the Project Area.

3.8.4.1 Project Area Land Use

The proposed Project Area is primarily composed of undeveloped open space/vacant lands. Land uses within the Project Area include ROWs, a utility corridor, recreational uses, and livestock grazing operations. No existing residential commercial, industrial or public facilities are located within the Project Area. Table 3-17 lists the land jurisdiction status within the boundary of the Wind Farm Site by action alternative. There are no private lands within the boundary of the Wind Farm Site or the associated features that comprise the Project Area.

Table 3-17 Land Jurisdiction Status within the Proposed Wind Farm Site

Jurisdiction	Alternative A		Alternative B		Alternative C		Alternative E	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
BLM	38,099	81	30,872	89	30,178	85	35,329	93
Reclamation	8,960	19	3,848	11	5,124	15	2,781	7
Total	47,059	100	34,720	100	35,302	100	38,110	100

ROWs for utilities and roads are located throughout the Project Area. Approximately 6 miles of the Mead to Phoenix designated utility corridor is located within the Wind Farm Site. Within this designated utility corridor, approximately 6 miles of the ROW for a 345-kV Liberty-Mead power line operated by Western crosses the southern portion of the Project Area east to west (see Map 3-8). Refer to Section 3.9 for information on transportation ROWs throughout the Project Area. The land use designation in the Mohave County General Plan for land that includes the Project Area is Rural Development Area, Alternative Energy. This includes both BLM-administered and Reclamation-administered lands.

3.8.4.2 Recreation

Lands within the Project Area are managed by BLM as the Kingman Extensive Recreation Management Area (ERMA). The Kingman ERMA provides opportunities for dispersed recreation including motorized and non-motorized activities for people from nearby communities, including the City of Kingman, Arizona. BLM manages the ERMA where recreation is non-specialized, dispersed, and does not require intensive management or developed facilities. The ERMA is managed to provide for public safety and protection of resources. The Project Area includes a variation in topography and terrain and ecologically diverse landscapes. The BLM Recreation Opportunity Spectrum (ROS) defines six classes of recreation opportunities ranging from primitive natural, low-use areas to urban highly developed, intensive use areas.

The BLM uses ROS classifications to set recreation management objectives for recreation management areas. Objectives are established to provide opportunities for desired recreation activities and to guide management of the setting needed to support those activities and the desired recreation experience. While the Kingman RMP did not establish ROS classifications for management of the ERMA where the Project is located, the current setting could be associated with a semi-primitive motorized objective. This objective allows for some opportunity for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment. It provides the opportunity to have a high degree of interaction with the natural environment, to have moderate challenge and risk and to use outdoor skills. The concentration of visitors is low, but the evidence of other area users is present.

Recreation opportunities in the Project Area include photography, backpacking, wildlife viewing, horseback riding, hunting, primitive camping, hiking, target shooting, and OHV use. All motorized vehicle use is restricted to existing roads, trails, and washes. One commercial Special Recreation Permit was issued in the Project Area in 2009 for a competitive event (BLM 2011), but there are no organized recreation events or Special Recreation Permits issued currently for activities or events in the Wind Farm Site.

AGFD manages hunting and trapping throughout the state including areas in and around the proposed Project Area. The Project Area is located in Arizona Game Management Units 15B and 15B-E. Wildlife species hunted within Game Management Units 15B and 15B-E include pronghorn antelope, elk, desert bighorn sheep, mountain lion, mule deer and javelina, and upland game bird species including dove and quail. As of 2008 data, the average number of hunting permits processed for the three most targeted species over the past five years includes: mule deer (390 permits), bighorn sheep (13 permits), and an antelope (7 permits). According to AGFD data, the most common game species that inhabits parts of the Project Area is mule deer (AGFD 2008).

3.8.4.3 Livestock Operations/Grazing Allotments/Grazing Permits

The Project Area is located on portions of two grazing allotments: Big Ranch Unit A and Big Ranch Unit B (Table 3-18). A majority of the Project Area is located within the Big Ranch Unit A allotment. The BLM categorizes grazing allotments by three types of management priority; “I” for improve, “M” for maintain, and “C” for custodial. Allotments within the Project Area are categorized as “I” for improve, and “C” for custodial. The two grazing allotments encompassing the Project Area are classified as ephemeral and authorized for yearlong cow-calf enterprises. In Arizona, BLM grazing allotments classified as ephemeral are rangelands that do not consistently produce enough forage to sustain a year round livestock operation but may briefly produce unusual volumes of forage to accommodate livestock grazing. There are no rangeland improvement features in Big Ranch Unit A or Big Ranch Unit B within the proposed Wind Farm Site (Map 3-8).

Table 3-18 Grazing Allotments in Proposed Wind Farm Site

Allotment Name	Management Priority	Allotment ID	Acres in Allotment	Permitted AUMs in Allotment	Acres within Project Area	Percentage of Allotment Located within Wind Farm Site
Big Ranch Unit A	I	00007	173,343	5,397	29,445	17.0
Big Ranch Unit B	C	00081	442,630	0	17,619	0.4

AUM=Animal unit month
SOURCE: LR 2000

3.9 TRANSPORTATION AND ACCESS

3.9.1 Introduction

This section includes a discussion of the existing transportation and access conditions in the project area, including routes, OHV, and air transportation. Transportation and access data were obtained and collected through literature reviews, Internet research, and coordination with the BLM and Reclamation. No field surveys were conducted.

3.9.2 Regional Overview

The major transportation corridor in the vicinity of the Project Area is US 93, which begins northwest of Wickenburg, provides access through Kingman, and continues northwest to Las Vegas. US 93 also provides access to Phoenix and is a major regional corridor and a key element of the Arizona’s principal highway freight network delivering commercial, public, and private drivers and their cargo from Phoenix to Las Vegas. US 93 also connects to Interstate 40 in Kingman, which is the main travel route between Las Vegas and the Grand Canyon. A portion of US 93 near the Project Area, between Pierce Ferry Road and Hoover Dam, has been identified as a Scenic Route in the Mohave County General Plan, which includes the portion of US 93 that passes west of the Project Area. Other regional highways include I-40/Historic Route 66, and State Route 68. I-40/Historic Route 66 (Route 66) is an east-west interstate that travels through Kingman, Arizona and extends westward south of the Project Area. Route 66 parallels and overlaps much of the I-40 alignment throughout Arizona and passes through the cities of Williams, Flagstaff, Winslow, and Holbrook. State Route 68 connects US 93, northwest of Kingman, Arizona, to Bullhead City, Arizona, which is located to the west at the Arizona/Nevada border. Temple Bar Road connects with US 93 west of the Project Area and is one of the nine paved access points to the Lake Mead NRA.

The Project Area is located east of US 93 and north of White Hills Road. The proposed Wind Farm Site would be accessible from US 93 via an existing 1.5 mile road to a gravel pit located west of the Project Area.

According to the ADOT, the 2009 Annual Average Daily Traffic (AADT) in the project vicinity along US 93 was approximately 9,000 vehicles. The State Highway Log identifies an increase in AADT throughout the section of US 93 that is located near the Project by approximately 1,300 vehicles per day since 2008 (ADOT 2009). The increase in daily traffic may be attributed to the ongoing highway improvements along US 93 in conjunction with the Hoover Dam Bypass Project. AADT has not yet been released for 2010. According to the Mohave County Public Works Traffic Count, 123 vehicles were recorded using the Temple Bar Road per day. The count period was between October 26, 2010 and November 2, 2010 (Mohave County Public Works 2010). This count was not taken during summer, which is the high use season of Lake Mead NRA, and may not present a fully accurate representation of yearly use of Temple Bar Road. Traffic data on certain roads within Lake Mead NRA are also maintained by NPS. Based on the traffic counts, NPS estimates that about 81,000 visitors entered Lake Mead NRA via Temple Bar Road in 2009 and about 68,000 visitors used this road in 2010 (Holland 2012).

The NPS also maintains traffic data for selected back roads within Lake Mead NRA. One of the access roads within the Wind Farm Site becomes Temple Bar Back Road (NPS Approved Road [AR] 134) as the road passes into Lake Mead NRA. While traffic count data were not collected for the Temple Bar Back Road, NPS staff suggested that the data would be comparable to AR136, Gregg's Hideout Road. Based on traffic count data for Gregg's Hideout Road, NPS estimates that in 2010 approximately 2,500 people traveled on this road and that visitor use on Temple Bar Back Road would be comparable (Holland 2012).

The nearest airport to the Project Area is the Kingman Airport and Industrial Park located 5 miles north of I-40, along U.S. Highway 66. The Kingman Airport Authority, Inc., a not-for-profit corporation, leases the airport from the City of Kingman. The airport has four runways and accommodates both single and multiple engine airplanes. The airport is open to the public. Triangle Airpark is located 0.5 mile northeast of White Hills Road and US 93. The airport has two runways (one asphalt and one dirt) and is privately owned by Boulder City Aero Club Inc. It is a private use airpark; landing requires prior written permission and the airpark use is limited to FAA visual flight rules. Based on input from the Triangle Airpark manager to Mohave County representatives, it is estimated that there are about 50 flights in or out of the airpark on an average week.

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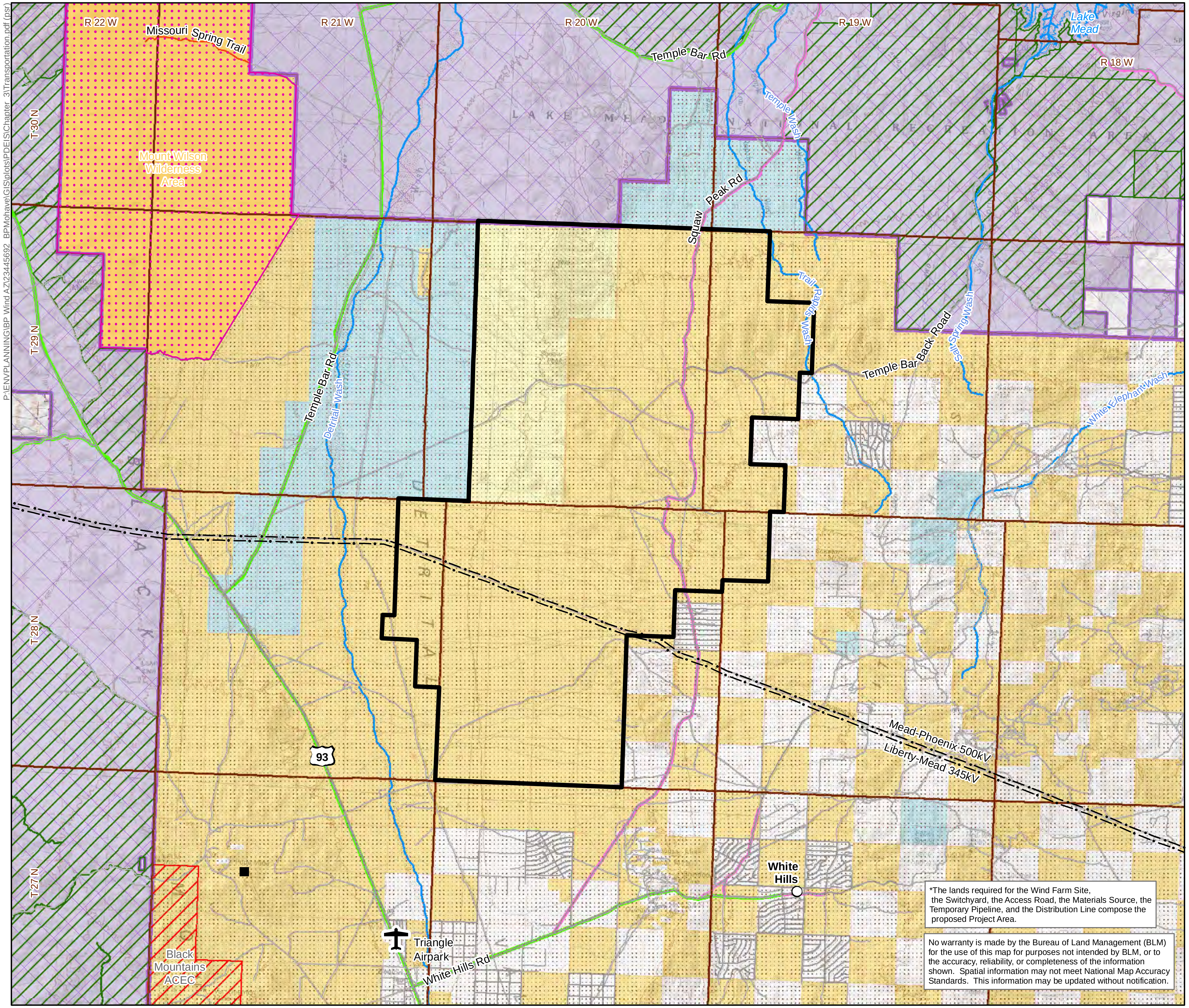

Map 3-9
Transportation

Mohave County Wind Farm Project

Legend

- Wind Farm Site*
- National Park Service Lake Mead National Recreational Area Boundary
- Bureau of Land Management Area of Critical Environmental Concern (ACEC)
- National Park Service Proposed Wilderness
- OHV Designated Existing Roads, Trails, and Washes
- OHV Designated Closed
- Route
- Trail
- Paved Road
- Bladed Road
- Airport
- Communication Tower

Surface Management

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- State Trust Land
- Private Land
- Bureau of Land Management Wilderness Area

General Features

- Community
- Existing Transmission Line
- Wash
- Township and Range Boundary
- Lake

Source:
Project Area Boundary: BPWE North America 2011
POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009
OHV Routes: BLM 2009
Streams: NHD 2008
Lake Mead Recreation Boundary: National Park Service, 2009
Base topographic data created with Copyright:© 2011 National Geographic Society, i-cubed

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3.9.3 Existing Conditions

3.9.3.1 Surface Transportation

Routes in the Project vicinity are a combination of unimproved dirt (primitive roads), improved (bladed) unpaved, and paved roads (Map 3-9, Transportation). The primary access to the Project from the north/south is US 93. White Hills Road is a paved secondary county road that extends east and then north from US 93. Squaw Peak Road (also referred to as Squaw Mountain Road) is a bladed dirt road that connects with White Hills Road south of the Project Area and is the only road that provides direct access to the Project Area. Squaw Peak Road is not maintained by Mohave County (Mohave County 2011).

The primary users of the unimproved routes in the area are hunters, OHV users, other recreationists, rangeland allottees, utility workers, and land managers. Approximately 42 miles of undesignated access roads are located within the Project Area and are open to motorized vehicle use year round.

Several routes within the Project Area provide access for recreation activities including hiking, OHV use, hunting, camping, and other recreational activities, although the level of recreational use is undocumented. White Hills Road is the primary access route used for recreation and hunting in the Project Area. According to the Mohave County Public Works Traffic Count, 344 vehicles were recorded using the White Hills Road per day. The count period was between October 26, 2010 and November 2, 2010 (Mohave County Public Works 2010). All motor vehicle travel in the Project Area is designated as limited to existing roads, washes, and primitive roads.

3.9.3.2 Air Transportation

There are no air transportation facilities located within the Project Area.

3.10 SOCIAL AND ECONOMIC CONDITIONS

3.10.1 Introduction

This section describes the existing socioeconomic conditions in the area that may be affected by the proposed Project. The key socioeconomic resources addressed in this section include population, housing, income, employment, agriculture, and commuting. This section presents information on existing (or baseline) conditions in the study area as it relates to these key parameters.

The data used for the socioeconomic analysis in this Draft EIS are the most recent published data from reliable sources. All efforts are made to ensure that these data are updated to their latest release year. Primary data sources include the U.S. Bureau of the Census (Census Bureau), U.S. Bureau of Economic Analysis (BEA), U.S. Bureau of Labor Statistics (BLS), Arizona Department of Economic Security, and the Arizona Department of Commerce.

3.10.1.1 Levels of Analysis

This section includes four geographic levels of analysis, from the immediate towns and communities near the Project Area. The four types of geographic levels are as follows:

1. Places: Concentrations of population are referred to as either Incorporated Places or Census Designated Places (CDPs) by the Census Bureau. The boundaries for the latter are informal estimates generated by the Census Bureau, and are generally larger than the towns in the sparsely populated West. Data are presented for the places of Bullhead City, Dolan Springs, and Kingman,

Arizona. Data are also presented for Boulder City, Nevada which is located close to the state and county boundary separating Clark County, Nevada and Mohave County, Arizona.

2. Mohave County, Arizona: The proposed Project is located in Mohave County and contains the socioeconomic areas most likely to be directly impacted by the proposed Project.
3. Arizona: Each state has a unique profile and serves as an introduction to the broader region.
4. United States: Comparisons to baseline U.S. patterns are enabled by inclusion of data pertaining to this level of geography.

The analysis focuses on the places closest to the Project Area and the County of Mohave where the Project is situated. Data on the state and national socioeconomic conditions are presented for comparison purposes.

3.10.2 Regional Overview

Mohave County is a large rural county in northern Arizona. There are several cities in Mohave County, but none with a population exceeding 50,000 people. Despite this, the county borders Clark County, Nevada, which contains the very large population center of Las Vegas, Nevada. While Mohave County serves as the region of analysis for socioeconomic resources, it is important to note that Mohave County is connected economically to Clark County. Approximately 20 percent of Mohave County residents work in Clark County, which is joined to Mohave County by US 93. Based on its physical proximity to the Project Area, data on Boulder City, Nevada, which is located just across the state boundary in Clark County, Nevada, are also included in this analysis.

3.10.3 Existing Conditions

Within the vicinity of the Project, there are a small number of homes and limited grazing of livestock. The affected environment of the proposed Project, however, extends beyond the Project vicinity to throughout Mohave County. The socioeconomic region of analysis for the proposed Project thus includes Mohave County, Arizona, with special emphasis on the towns of Dolan Springs, Bullhead City, Kingman, and Boulder City (Nevada). Dolan Springs is the CDP located closest to the Project Area, while the other cities are the closest towns to the Project Area with populations of 10,000 or more. White Hills is the community that is closest to the Project, but is not described in this section due to lack of data.

3.10.3.1 Demographics

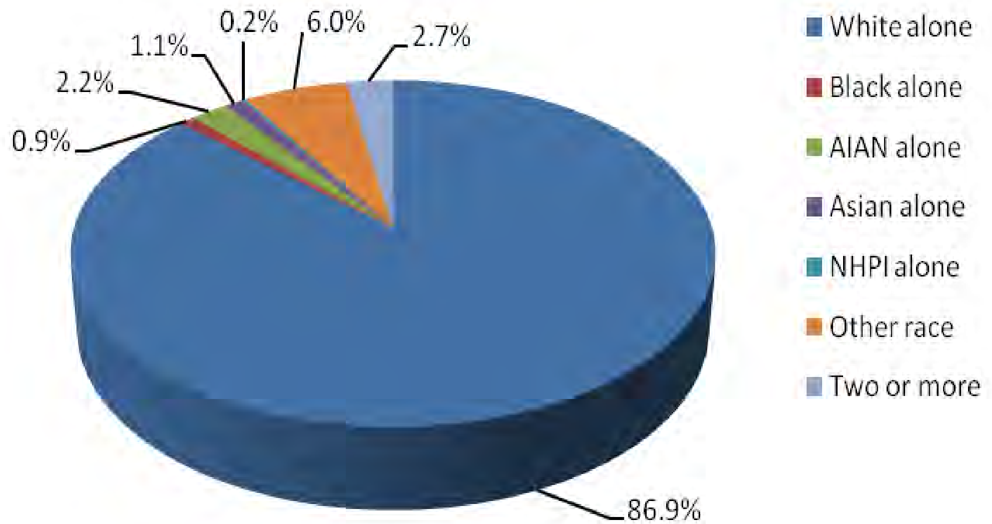
This section describes and discusses the current and projected future population and demographics of Mohave County, Arizona, as well as the towns of Bullhead City and Kingman, Arizona. The population of the communities of Dolan Springs, Arizona and Boulder City, Nevada are also located near the proposed Project boundary, so data are provided for those communities as available. The most recent data for Dolan Springs and Boulder City communities are from the 2010 Census and the Arizona Department of Commerce. Unless otherwise noted, the data provided are from the Census Bureau.

Mohave County

The 2010 population of Mohave County, as provided by the 2010 Census, is estimated to be 200,186. This compares to a 2000 population estimated at 155,032, which represents a 2.6 percent average annual growth rate in the county from 2000 to 2010. This is slightly higher than the 2.2 percent average annual growth rate for the State of Arizona during this time period, and significantly higher than the national average growth rate of 0.9 percent.

Of the Census Bureau total, 173,880 people, or 87 percent of the Mohave County population, identify themselves as white alone. Approximately 12,000 people identify themselves as some other race, or nearly 6 percent of the total population. Approximately 2 percent of the population, or 4,500 people, identify themselves as American Indian-Alaskan Native (AIAN) alone. Nearly 5,500 (3 percent) claim two or more races. The remaining 2 percent are comprised of black alone, Asian alone, and Native Hawaiian or Other Pacific Islander (NHOPI) alone (Figure 3-3).

Figure 3-3 Population Distribution by Race in Mohave County, Arizona in 2010



SOURCE: U.S. Bureau of the Census 2010 (Census 2010e)

Dolan Springs CDP, Arizona

The population of the Dolan Springs CDP in 2010 was 2,033 people. This is an annual growth rate of 0.9 percent from the 2000 population of 1,867. This is a lower growth rate than the overall growth rate exhibited within Mohave County (2.6 percent) and the growth rate in Arizona (2.2 percent) and equal to the U.S. population growth rate over this period (0.9 percent).

Bullhead City, Arizona

The population of Bullhead City in 2010 was estimated at 39,366, up from a population of 33,769 in 2000. This is an annualized growth rate of 1.5 percent from 2000, lower than the overall growth of Mohave County and Arizona, but higher than the overall U.S. growth over the same period.

Kingman, Arizona

The population of Kingman in 2010 was estimated at 28,068, up from a population of 20,069 in 2000. This is an annualized growth rate of 3.4 percent from 2000, higher than the overall growth of Mohave County, Arizona, and the U.S. over the same period.

Boulder City, Nevada

The population of Boulder City in 2010 was estimated at 15,023, up from a population of 14,966 in 2000. This is an annualized growth rate of less than one percent from 2000, which is driven by a controlled growth ordinance making the increase lower than the overall growth of Mohave County, Arizona, and the U.S. over the same period. Population in each geographic level of analysis is displayed in Table 3-19.

Table 3-19 Resident Population and Annualized Population Change for the Project Vicinity and Comparison Areas

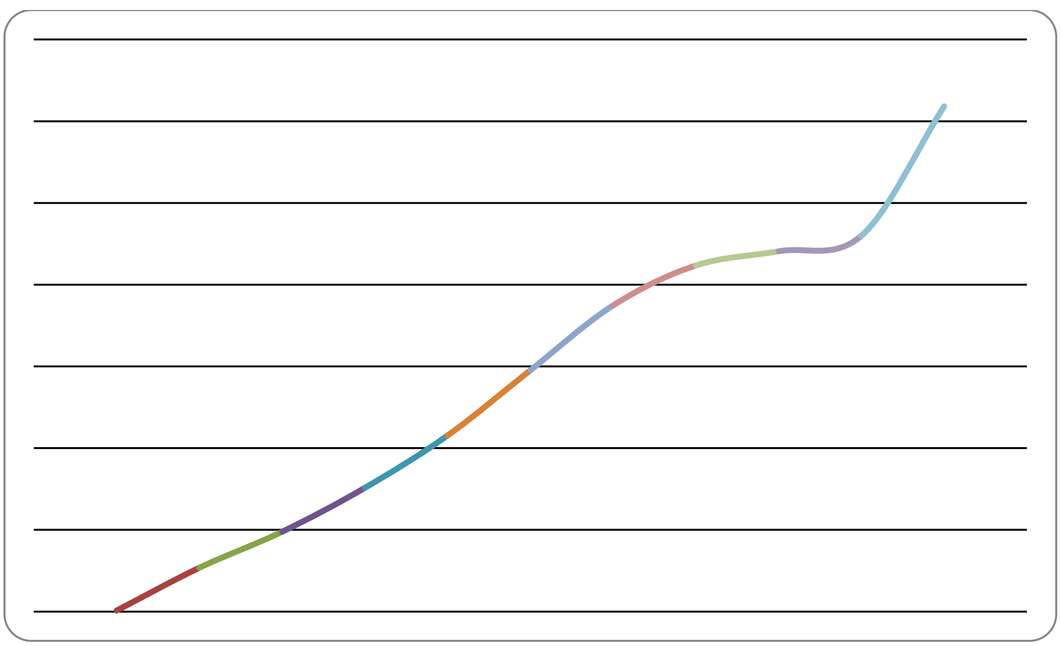
	Resident Population				Annualized Population Change		
	1990 Census	2000 Census	2010 Census	2020 Estimate	1990-2000	2000-2010	2010-2020
Dolan Springs	1,090	1,867	2,033	2,560	5.5%	0.9%	2.3%
Boulder City, Nevada	12,760	14,966	15,023	16,197	1.6%	0.0%	0.8%
Bullhead City, Arizona	21,951	33,769	39,366	46,836	4.4%	1.5%	1.8%
Kingman, Arizona	12,722	20,069	28,068	37,418	4.7%	3.4%	2.9%
Mohave County, Arizona	93,497	155,032	200,186	254,630	5.2%	2.6%	2.4%
Arizona	3,665,228	5,130,632	6,392,017	8,017,238	3.4%	2.2%	2.3%
United States	248,709,873	281,421,906	308,745,500	339,750,123	1.2%	0.9%	1.0%

SOURCES: U.S. Bureau of the Census 1990, 2000, 2010; Nevada State Demographer's Office 2009; Arizona Department of Commerce 2009; Arizona Department of Economic Security, Research Administration, Population Statistics Unit 2006.

3.10.3.2 Housing Characteristics

Total housing units in Mohave County are estimated at 110,911 for 2010 (Census 2008). As would be expected due to population growth, housing has grown significantly since 2000, when housing units were estimated at 80,062. Growth in the number of housing units since 2000 is presented in Figure 3-4.

Figure 3-4 Mohave County Housing Units 2000-2010



SOURCE: U.S. Census Bureau 2010 (Census 2010a)

Based on the 2010 Census, Mohave County has a home occupancy rate of 74.4 percent and a vacancy rate of 25.6 percent (28,372 vacant units). Of the occupied housing units, the homeownership rate was 69.9 percent. Median value of owner-occupied homes in Mohave County over the 2005-2009 period was $179,300 (Census 2010b).

Dolan Springs CDP

According to the 2010 Census, in the Dolan Springs CDP there are 1,556 housing units, of which there are 1,007 occupied (64.7 percent). Nearly all are owner-occupied (856 units), with only 151 units occupied by renters. The median house value of owner-occupied units in over the 2005-2009 period was $83,600.

Bullhead City, Arizona

Over the 2005 – 2009 period, median values of owner-occupied housing in Bullhead City are estimated at $150,200, with a total of 23,464 housing units. Over 70 percent of those housing units are occupied (16,761). Owner-occupied housing accounts for over 60 percent of the occupied housing (10,198 units). There are 6,703 vacant housing units in Bullhead City as of 2010 (28.6 percent) (Census 2010b).

Kingman, Arizona

Median values of owner-occupied homes over the 2005 – 2009 period in Kingman are estimated at $171,400. There are 12,724 total housing units, with 11,217 units (88.2 percent) occupied. Of those occupied 7,352 are owner-occupied (65.5 percent), with a total vacancy rate of 11.8 percent (1,507 units) (Census 2010b).

Boulder City, Nevada

According to the 2010 Census, there are 7,412 housing units in Boulder City, of which 6,492 are occupied (87.6 percent). Of those occupied, 4,545 are owner-occupied (70.0 percent), with only 1,947 units occupied by renters (30.0 percent). The homeowner vacancy rate is 3.0 percent, while the rental vacancy rate is 12.4 percent. The median house value of owner-occupied units over the 2005 – 2009 period was $325,200.

3.10.3.3 Income Levels

The industries that are the largest contributors to income in Mohave County include government and government enterprises, health care and social assistance, retail trade, and construction (BEA 2009).

All income figures are presented in 2009 dollars, as adjusted by the Consumer Price Index. Total personal income in 2009 for Mohave County was $5.1 billion, with a per capita income of approximately $26,185. The county median household income for 2005 to 2009 was $40,159, compared to $50,932 for Arizona as a whole. Approximately 10.7 percent of families and 15.5 percent of individuals in Mohave County during the 2005 - 2009 period were below poverty level, which is a little higher than for Arizona as a whole (10.5 and 14.7 percent, respectively) (Census 2010b).

Table 3-20 summarizes income characteristics at each geographic level of analysis. Although income data for each geographic area are collected in different years, all values are adjusted to 2009 dollars. As indicated in the table, the Project vicinity of Mohave County has lower per capita and household income than other areas in Arizona and the United States. Dolan Springs, a community near to the Project Area, has significantly lower income levels than the state and the nation.

Table 3-20 Per Capita and Median Income in Project Vicinity 2005-2009 (2009 Dollars)

Place	Per Capita Income	Median Household Income
Dolan Springs, Arizona	$14,360	$31,090
Boulder City, Nevada	$37,400	$60,950
Bullhead City, Arizona	$20,810	$38,500
Kingman, Arizona	$20,030	$43,300
Mohave County, Arizona	$21,320	$40,160
Arizona	$25,200	$50,300
United States	$27,040	$51,430

SOURCE: U.S. Bureau of the Census, American Community Survey 2005-2009, June 3, 2011. (Census 2010b)

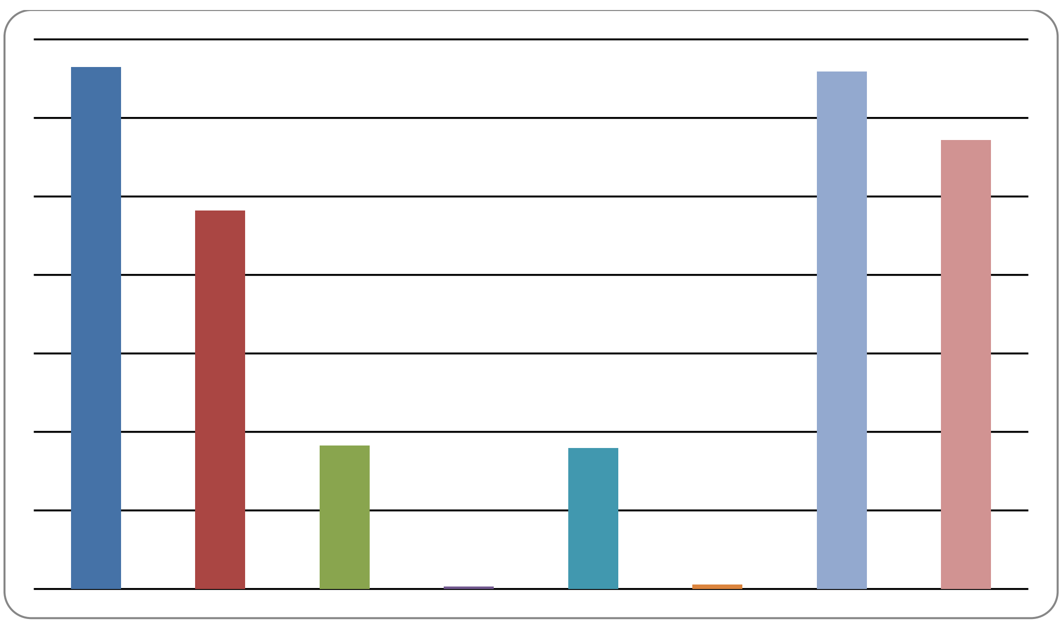
3.10.3.4 Employment

Mohave County

The total 2010 labor force in Mohave County is 91,814, with an unemployment rate of 10.1 percent. The major employers include retail trade, health care and social assistance, and construction (Arizona Department of Commerce 2011). The labor force measures the number of people residing in Mohave County who participate in paid employment. The labor force exceeds employment in Mohave County since many people who live in Mohave County work in Clark County, Nevada (and employment is measured by place of work rather than place of residence).

Mohave County had a total employment in 2009 of over 66,000 jobs. Most of this employment was private, nonfarm employment, with proprietor employment representing a significant proportion of employment (27.5 percent, Figure 3-5).

Figure 3-5 Total Employment by Type in Mohave County, Arizona in 2009



SOURCE: Bureau of Economic Analysis 2009

The largest employment sectors in Mohave County in 2009 were retail trade, state and local government, accommodations and food services, and real estate and rental and leasing (see Table 3-21). Overall employment growth in the County since 2001 is 19 percent, or 2.2 percent average annual growth. This employment growth, which reflects the high population growth in the area, is greater than the total employment growth in the rest of the state (14 percent from 2001 to 2009). The sectors adding the largest number of jobs in Mohave County since 2001 are real estate and rental and leasing, retail trade, health care and social assistance, and administrative and food wastes. Each of these sectors added more than 1,000 jobs between 2001 and 2009. Despite the growth in employment, unemployment in Mohave County has increased from 4.0 percent in 2000 to 10.1 percent in April 2011. This is a higher unemployment rate than the state and nation, with rates of 9.3 percent and 9.0 percent, respectively (BLS 2009).

In addition to highlighting industry size and growth, Table 3-21 also illustrates the industry sectors in Mohave County that are more concentrated than in Arizona as a whole. The last column in the table shows the location quotient, or relative concentration of employment in each industry in Mohave County compared to the state economy. Sectors with a location quotient greater than 1.0, account for a greater proportion of employment in Mohave County than in the State of Arizona, while sectors with a location quotient less than 1.0 account for a smaller proportion of Mohave County employment than is typical in the state.

Table 3-21 Employment Growth and Location Quotient by Industry

Industry	Mohave County Employment		Percent Growth 2001-2009		Location Quotient
	2001	**2009**	**Mohave**	**Arizona**	**Mohave vs. Arizona**
Farm	417	551	32%	22%	0.98
Forestry, fishing, related activities, other	(D)	(D)	N/A	-17%	N/A
Mining	(D)	531	N/A	51%	1.32
Utilities	298	312	5%	16%	1.16
Construction	6,712	5,039	-25%	-15%	1.35
Manufacturing	3,342	3,195	-4%	-23%	0.95
Wholesale trade	1,119	1,134	1%	8%	0.49
Retail trade	9,335	10,439	12%	12%	1.40
Transportation and warehousing	1,444	1,782	23%	11%	0.96
Information	959	1,060	11%	-21%	1.05
Finance and insurance	1,528	1,948	27%	28%	0.49
Real estate and rental and leasing	2,410	5,270	119%	58%	1.33
Professional, scientific, and technical services	1,832	2,340	28%	26%	0.55
Management of companies and enterprises	186	(D)	N/A	29%	N/A
Administrative and waste services	2,595	3,599	39%	6%	0.70
Educational services	320	709	122%	92%	0.56
Health care and social assistance	5,555	8,135	46%	44%	1.20
Arts, entertainment, and recreation	881	1,138	29%	28%	0.81
Accommodation and food services	5,157	6,030	17%	12%	1.22
Other services, except public administration	3,843	4,280	11%	11%	1.28
Federal, civilian	502	527	5%	21%	0.45
Military	361	417	16%	4%	0.59
State and local government	6,911	7,746	12%	14%	1.04
Total employment	**55,965**	**66,435**	19%	14%	1.00

SOURCE: Bureau of Economic Analysis 2009

(D) Not shown in order to avoid the disclosure of confidential information; estimates are included in higher level totals.

Dolan Springs CDP

According to the Arizona Department of Commerce, the 2011 civilian labor force in Dolan Springs is 839 people. The labor force increased at an average annual rate of 3.5 percent from 2000 when the labor force was 573 people (Arizona Department of Commerce 2011). This is slightly lower than the annual population growth of 5.5 percent. Unemployment in 2011 was 24.3 percent, up from 11.0 percent in 2000.

Bullhead City, Arizona

Total 2011 labor force in Bullhead City is 21,588 people, an average annual increase of 2.6 percent from 2000. The unemployment rate increased from 4.3 percent in 2000 to a rate of 9.6 percent in 2011.

Kingman, Arizona

The total 2008 labor force of Kingman is 12,349, an average annual growth of 2.6 percent since 2000. The unemployment rate increased from 4.1 percent to a rate of 9.9 percent over the same period.

Boulder City, Nevada

According to the 2005 – 2009 American Community Survey, the labor force in Boulder City is 6,520. Of those, there were 335 unemployed, resulting in an unemployment rate of 5.1 percent.

3.10.3.5 Agriculture

There is some agricultural activity in Mohave County, but it is neither a large employer nor a large income producing sector. In 2009, farm employment was estimated at 551 jobs, with a total of 303 farm proprietors (BEA 2009). There are 334 farms in Mohave County that cover 858,392 acres, primarily in forage crops (hay, haylage, silage, greenchop). High value crops include nursery and greenhouse crops. The total market value of agriculture products sold in 2007 was $19.2 million (2009 dollars), primarily from crops but also from cattle and calves and other livestock commodities (USDA 2007).

3.10.3.6 Commuting

Nearly 94 percent of those who work in Mohave County also reside there, with few non-residents commuting to work in the County (those that do commute to Mohave County are primarily from Clark County, Nevada). In contrast, approximately one-quarter of Mohave County workers commute to jobs located outside the County. Most people commuting outside of Mohave County work in Clark County, Nevada. The Project Area is accessed via US 93, which is the primary travel route between Clark County, Nevada and Mohave County, Arizona. There are also Mohave County residents commuting to San Bernardino County, California; Washington County, Utah; and other counties in Arizona (Arizona Workforce Informant 2010).

3.11 ENVIRONMENTAL JUSTICE

3.11.1 <u>Introduction</u>

The USEPA Office of Environmental Justice provides the following definition of environmental justice:

> *"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a*

> *disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies."*

The concept of environmental justice is rooted in the Civil Rights Act of 1964, which prohibited discrimination in Federally assisted programs, and in Executive Order 12898, "*Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*," issued February 11, 1994. Executive order 12898 was intended to ensure that Federal actions and policies do not result in disproportionately high and adverse effects on minority or low-income populations. It requires each Federal agency to incorporate environmental justice into its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including social or economic effects, of its programs, policies, and activities implemented both directly and indirectly (for which it provides permitting or funding), on minority populations and low-income populations of the United States (President's Council on Environmental Quality [CEQ] 1997). Additional guidance from the President's CEQ clarifies that environmental justice concerns may arise from effects on the natural and physical environment that produce human health or ecological outcomes, or from adverse social or economic changes.

Environmental justice issues are mandated and regulated at the Federal level, and compliance with NEPA requires analysis of environmental justice effects. As such, environmental justice is considered part of the NEPA process.

This section provides the background data for the analysis of environmental justice. The key socioeconomic parameters addressed here are race/ethnicity and measures of social and economic well-being, including per capita income, median household income, and poverty rates. The data used for this analysis of environmental justice impacts are from the most recent available or published data from reliable sources. All efforts are made to ensure that these data are updated to their latest release year for the specific level of analysis. Primary data sources include the U.S. Bureau of the Census, U.S. Bureau of Economic Analysis, and U.S. Bureau of Labor Statistics.

It is important to note that the geographic boundaries and divisions of Census Tracts and Block Groups are modified in Census 2010 (Figure 3-6(b)) compared to Census 2000 (Figure 3-6(a)). Also, economic data, such as poverty status, per capita income, and median household income, are now only collected through the American Community Survey and are no longer a part of the census data collection. The latest available American Community Survey data are 2005-2009 5-Year Estimates, which are provided for the Census 2000 geographic unit boundaries. Therefore, analysis of lower income populations is carried out using slightly different geographic boundaries (see Table 3-20), while data for identifying populations of minorities are analyzed based on 2010 Census boundaries (see Table 3-21).

3.11.1.1 Levels of Analysis

The geographic scope of the information presented primarily includes Mohave County and Census Tracts in the vicinity of the Project Area, with data on the State of Arizona and the United States provided for comparison purposes. Where available, data are presented at the level of the Census Block Group (within one Census Tract) in the county in which the Project Area is located, and also for the two larger cities of Kingman and Bullhead City and the Dolan Springs CDP. In addition to areas in Mohave County, Boulder City in the State of Nevada is also included in this analysis due to its vicinity to the Project Area. The locations of these geographic units in relation to the Project Area are presented in Figures 3-6(a) and 3-6(b). These data are used to identify geographic concentrations of minority and low-income populations that may potentially suffer disproportionately high and adverse human health or environmental effects from the Project.

The five geographic levels of analysis are described below:

1. Census Tracts, Block Groups, and Blocks: Decennial census data are gathered at the level of Blocks, extremely small units of geography originating with city blocks. Block Groups are aggregates of Census Blocks, but their boundaries are drawn in part to respect political subdivisions including the boundaries of counties, cities, and American Indian Reservations. Block Groups, in turn, form Census Tracts, which are even larger units of geography that divide a county into population areas of approximately 3,000 persons. Eight and fourteen Census Tracts in the vicinity of the Project Area are included in the analysis (eight for the analysis of economic data based on 2005-2009 American Community Survey, and fourteen for the analysis of demographic data based on Census 2010). Block Group-level data are presented for the Block Group where the proposed Project would be physically located. Block-level analysis is not presented.
2. Places: Concentrations of population are referred to as either Incorporated Places or CDPs by the U.S. Census Bureau. The boundaries for the latter are informal estimates generated by the U.S. Census Bureau, and are generally larger than the townsite in the sparsely populated West. Data are presented for Bullhead City and Kingman in Arizona and Boulder City in Nevada, as well as for the Arizona CDP of Dolan Springs.
3. Mohave County, Arizona: The county is a larger area with the proposed Project Area located within it, and is the area most likely to be directly impacted by the proposed Project.
4. Arizona: Each state has a unique profile and serves as an introduction to the broader region.
5. United States: Comparisons to baseline U.S. patterns are enabled by inclusion of data pertaining to this level of geography.

3.11.2 Regional Overview

Mohave County is a large rural county in northern Arizona, without a significantly large urban population center. However, it borders Clark County, Nevada, in which is located the very large population center of Las Vegas, Nevada. While Mohave County and some Census Tracts and cities and CDPs within it serve as the study area for the environmental justice analysis, it is important to note that Mohave County is connected economically to Clark County. Approximately 20 percent of Mohave County residents work in Clark County. Based on this connection, data on Boulder City, Nevada which is located just across the state boundary in Clark County, Nevada are also included in this analysis.

3.11.3 Existing Conditions

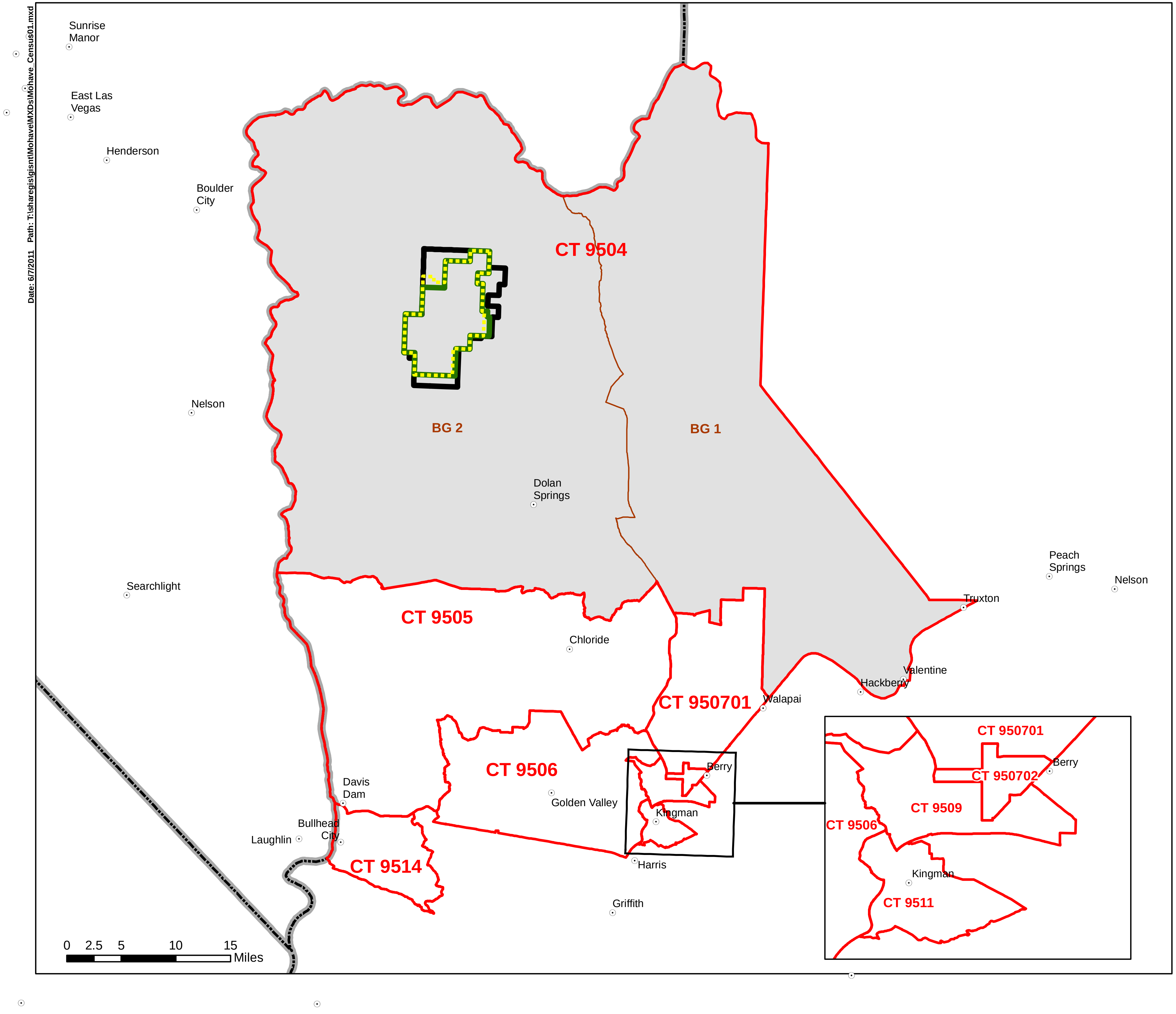
This section provides data on low-income and minority populations in the region of analysis as described in Section 3.10.

3.11.3.1 Low-Income Populations

According to the CEQ Guidance, communities should be identified as "low-income" based on the "annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty" (CEQ 1997). In other words, a community can be considered low-income if the median household income for a census tract is below the poverty line or if there are other indications of the presence of a low-income community within the Census Tract. For the purpose of this analysis, the per capita income, median household income, and poverty rates in the Census Tracts, select Census Block Group, and some major cities and a CDP in the vicinity of the Project Area are compared to those in Mohave County in order to identify low-income communities that may potentially suffer disproportionately high and adverse effects of the Project.

Figure 3-6(a)
Location of Census Tracts and Select Block Groups in the Vicinity of the Proposed Project Area (based on 2000 Census Geographic Divisions)

Mohave County Wind Farm Project



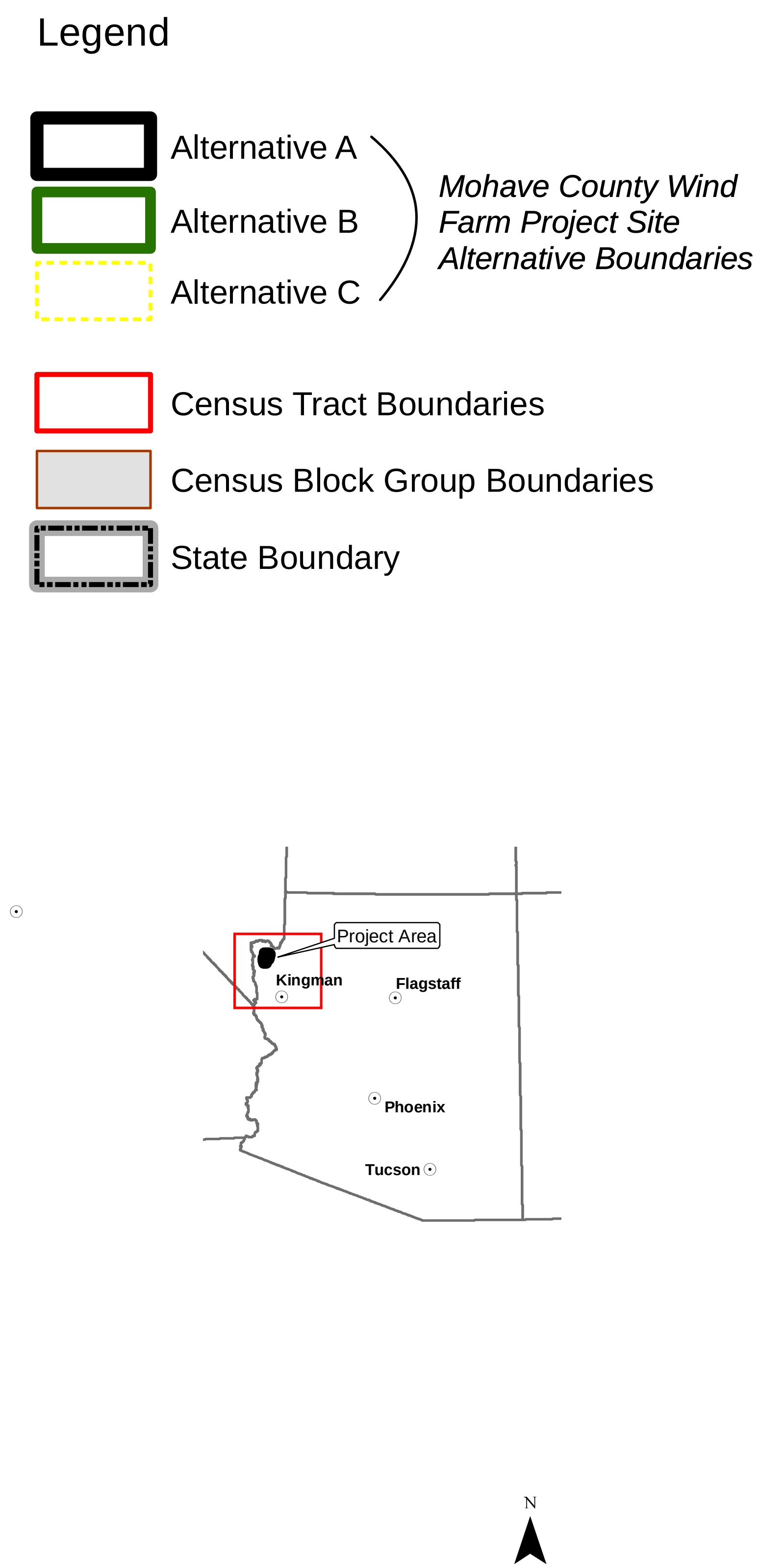
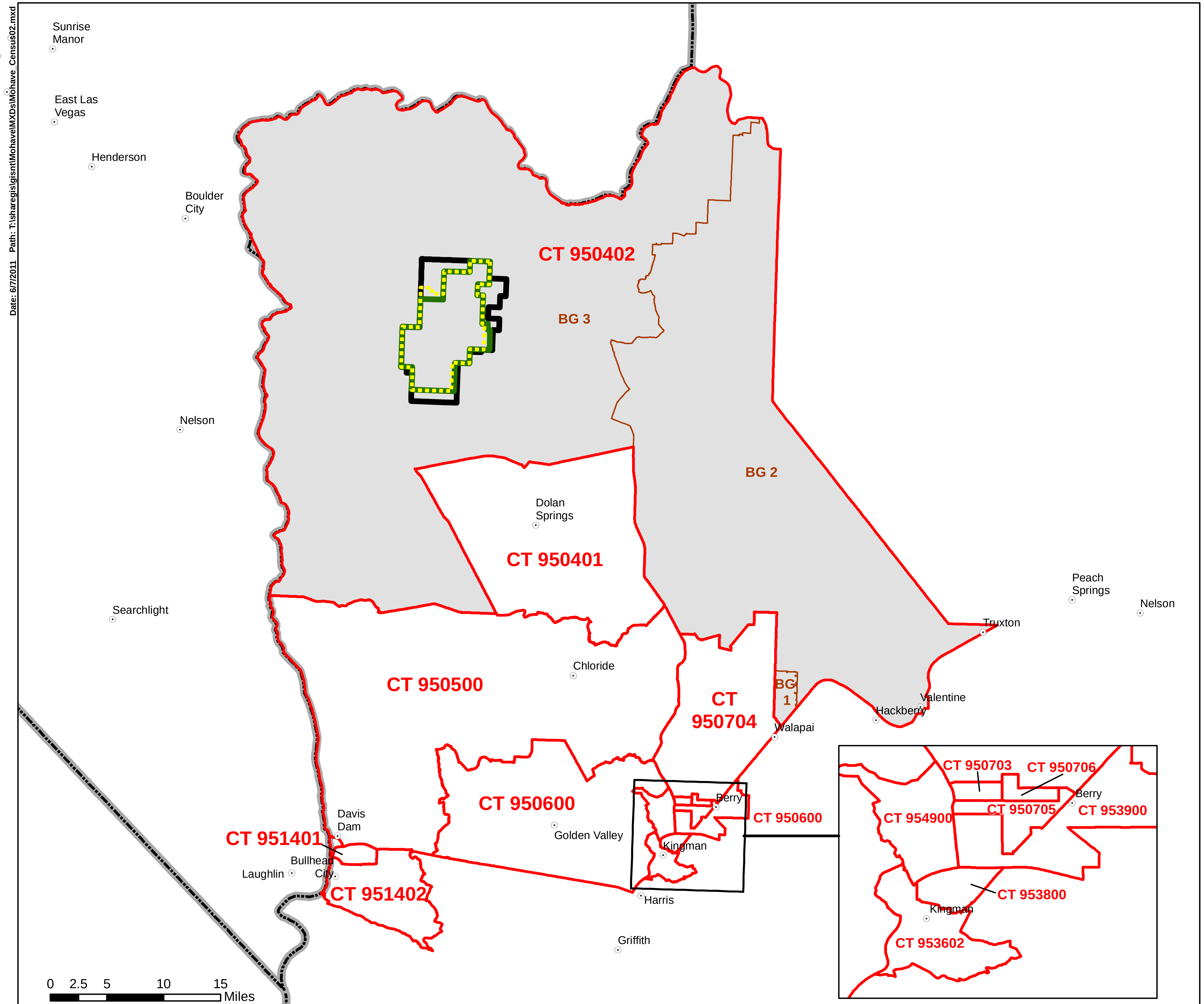


Figure 3-6(b)
Location of Census Tracts and Select Block Groups in the Vicinity of the Proposed Project Area (based on 2010 Census Geographic Divisions)

Mohave County Wind Farm Project

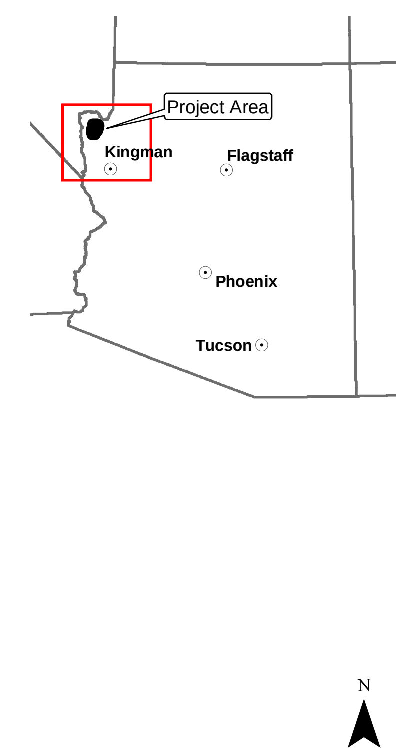


Legend

Alternative A
Alternative B
Alternative C

Mohave County Wind Farm Project Site Alternative Boundaries

Census Tract Boundaries
Census Block Group Boundaries
State Boundary



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As derivatives of total personal income, per capita and median household income and poverty rates represent widely used economic indicators of social well-being. Table 3-22 presents these socioeconomic data for the Census Tracts, select Block Group, major cities and a CDP in the vicinity of the Project Area, Mohave County, and Arizona. All income data presented in this section are inflated to 2009 U.S. dollars. Based on 2005-2009 data, per capita personal income in Mohave County is $21,321, which is approximately 85 percent of the statewide level of $25,203 and 79 percent of the national average of $27,041. The per capita income in Mohave County is about $4,000 less than that in Arizona and $6,000 less than the United States. The average annual growth rate of this income from 1997 to 2007 in Mohave County was 3.9 percent compared to 4.2 percent for the state and 4.3 percent for the nation.

There is some disparity between local, county, and statewide conditions in the context of median household incomes. Based on 2005-2009 American Community Survey data, median household incomes in Mohave County and Arizona were $40,157 and $50,296, respectively (see Table 3-22). Data at the Block Group level are not yet available from the 2005-2009 American Community Survey. However, based on the 2000 Census data, median household income levels were even lower than the county in the two Block Groups in Census Tract 9504, where the proposed Project would be located; with Block Group 1 at $34,974 and Block Group 2 at $22,489. Overall, seven of the eight Census Tracts analyzed in the vicinity of the Project Area (Census Tract 9514 is the exception) had a median household income lower than the county. However, of the cities and CDP analyzed, Kingman in Arizona and Boulder City in Nevada had median household incomes higher than Mohave County.

Finally, poverty rates represent the percentage of an area's total population living at or below the poverty threshold established by the U.S. Census Bureau. Based on 2005-2009 American Community Survey data, the poverty rate was 15.5 percent in Mohave County and 14.7 percent in the State of Arizona (Census 2005-2009a). However, based on 2000 Census data (given that data at the Block Group level are not yet available from the 2005-2009 American Community Survey) at 26.3 percent, Block Group 2 in Census Tract 9504, where the proposed Project would be located, had a higher poverty rate than the county and state (70.4 percent higher than the county) (see Table 3-22). In fact, of all the areas examined in this analysis, this Block Group has the highest poverty rate. The entire Project Area is located in Census Tract 9504, Block Group 2; for the area of analysis, this is the largest Block Group in terms of area. The poverty rate in Census Tract 9504, where the Project would be located, is 18.2 percent higher than the poverty rate in Mohave County.

Table 3-22 Income and Poverty Rates based on 2005-2009 American Community Survey 5-Year Estimates[1] (incomes in 2009 dollars)

Area[2]	Per Capita Income	Median Household Income	Poverty Rate	% Difference in Poverty Rate Compared to Mohave County
Census Tract 9504	$21,157	$38,041	18.3%	18.2%
Block Group 2[3] (Project)	$16,798	$22,489	26.3%	70.4%
Census Tract 9505	$35,382	$33,750	8.0%	-48.2%
Census Tract 9506	$15,961	$32,186	16.3%	5.5%
Census Tract 9507.01	$17,835	$34,116	21.0%	35.9%
Census Tract 9507.02	$15,667	$29,571	20.9%	35.3%
Census Tract 9509	$21,021	$36,598	21.7%	40.3%
Census Tract 9511	$16,886	$39,009	20.1%	30.1%
Census Tract 9514	$26,745	$41,049	13.6%	-11.8%
Bullhead City	$20,809	$38,505	17.9%	15.7%
Kingman City	$21,030	$43,299	15.4%	-0.5%
Dolan Springs CDP	$14,358	$31,089	24.2%	56.5%
Boulder City, Nevada	$37,366	$60,948	7.8%	-49.8%
Mohave County	$21,321	$40,157	15.5%	0.0%
State of Arizona	$25,203	$50,296	14.7%	-4.7%
United States	$27,041	$51,425	13.5%	-12.8%

SOURCES:

U.S. Census Bureau 2005-2009 American Community Survey. *B17001. Poverty Status in the Past 12 Months by Sex by Age*.

U.S. Census Bureau 2005-2009 American Community Survey. *B19013. Median Household Income in the Past 12 Months (In 2009 Inflation-Adjusted Dollars).*

U.S. Census Bureau 2005-2009 American Community Survey. *B19301. Per Capita Income in the Past 12 Months (in 2009 Inflation-Adjusted Dollars)*.

NOTES:

1 Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. In addition to sampling variability, the American Community Survey estimates are subject to nonsampling error.

2 The geographic divisions of Census Tracts and Block Groups for the 2005-2006 American Community Survey data are based on the 2000 Census (Figure 3-6(a)). Therefore, the units in this table differ from those presented in Table 3-21 (Figure 3-6(b)) for race data, which are based on Census 2010 geographic unit boundaries and divisions.

3 Block Group-level data are not available from the 2005-2006 American Community Survey. Therefore, while it is acknowledged that older data do not provide the best comparison, economic data from Census 2000 for the two Block Groups in Census Tract 9504 are presented to give some idea of how they compare to Mohave County.

3.11.3.2 Minority Populations

In accordance with CEQ Guidance, minority populations should be identified if the minority population in the project rea "exceeds 50 percent" or if the percentage of minority population in the project area is meaningfully greater than the "minority population percentage in the general population or other appropriate unit of geographic analysis" (CEQ 1997). For this analysis, the population percentages of the various racial and ethnic groups in Census Tracts, a select Census Block Group, and major cities and a CDP in the vicinity of the Project Area are compared to those in Mohave County in order to understand any disproportionately high and adverse effects of the Project on minorities.

Table 3-23 presents the racial and ethnic makeup of the Census Tracts and a select Census Block Group in the vicinity of the Project Area, the Cities of Bullhead City, Kingman, and Boulder City, Dolan Springs CDP; Mohave County, Arizona; and the United States based on 2010 Census data. The entire Project Area would be located in Census Tract 9504.02, Block Group 3. Mohave County is less diverse racially than both the state and nation, with only about 13 percent of residents identifying themselves as a racial minority in the 2010 Census. Statewide, 27 percent of residents belong to a racial minority compared with about 28 percent nationwide (Census 2010c, d). Ethnically, the county is less diverse than the state or nation as well, as only around 15 percent of county residents identified themselves as Hispanic or Latino in 2010, compared to about 30 percent of residents in the state and a little over 16 percent in the nation. Thus, there are relatively smaller proportions of racial minorities or Hispanic/Latino populations in the county compared with the state or nation.

The predominant racial group in Mohave County is White (Caucasian), comprising roughly 86.9 percent of the countywide population in 2010. The largest minority group in the county is Hispanics/Latinos, making up 14.8 percent of total 2010 population, followed by Some Other Races making up 6.0 percent of the total Mohave County population and Two or More Races comprising 2.7 percent of the county population based on 2010 data. Other racial groups, combined, represent only about 4.4 percent of the local population, led by AIAN (2.2 percent) and Asians (1.1 percent).

Analyzing these data at a smaller geographic scale, the racial and ethnic makeup of the Census Tracts in the vicinity of the Project Area is less diverse than countywide conditions in general, except for Bullhead City and areas around Kingman. In Census Tract 9504.02, Block Group 3, the Block Group in which the Project would be physically located, Whites make up approximately 92.8 percent of total population (based on 2010 data). While the Block Group has lower percentages of all racial and ethnic groups compared to Mohave County, Census Tract 9504.02 has a larger proportion of AIAN (3.5 percent) relative to the County. Based on the data presented in Table 3-23, the Census Tracts in the vicinity of Kingman (9536.02 and 9536), as well as the two cities of Bullhead City and Kingman, have generally higher percentages of minority groups compared to the county.

Table 3-23 Population by Ethnic and Racial Groups (based on 2010 Census Population)

Area	2010 Population	Race							Ethnicity
		White	Black	AIAN	Asian	NHOPI	Other	Two or More Races	Hispanic or Latino[a]
Census Tract 9504.01	2,051	90.7	0.8	1.1	0.5	0.1	4.5	2.3	11.3
Census Tract 9504.02	3,950	91.4	0.6	3.5	0.8	0.2	1.7	1.9	5.8
Block Group 3 (Project)	1,408	92.8	0.8	1.4	0.6	0.1	1.9	2.3	6.0
Census Tract 9505	1,446	90.0	1.5	0.8	0.9	0.3	2.8	3.7	11.8
Census Tract 9506	9,029	90.9	0.4	1.5	1.0	0.3	3.2	2.7	10.6
Census Tract 9507.03	3,880	90.1	0.5	1.6	0.7	0.2	3.7	3.2	11.9
Census Tract 9507.04	5,995	91.7	0.9	1.5	0.9	0.2	2.2	2.7	10.1
Census Tract 9507.05	4,132	88.2	0.9	1.1	0.6	0.1	6.6	2.4	14.9
Census Tract 9507.06	3,825	87.6	0.7	1.6	0.5	0.2	5.3	4.1	12.4
Census Tract 9514.01	3,748	88.7	1.4	0.7	1.8	0.2	4.3	2.9	11.7
Census Tract 9514.02	4,036	87.0	1.4	1.1	2.1	0.2	5.7	2.5	16.1
Census Tract 9536.01	8,853	89.2	0.7	1.3	1.9	0.2	3.8	2.9	12.0
Census Tract 9536.02	2,647	85.0	1.4	2.8	0.9	0.2	6.3	3.5	16.1
Census Tract 9538	6,345	86.3	1.0	1.7	1.2	0.7	5.5	3.6	13.7
Census Tract 9549	3,796	91.3	1.2	1.3	1.4	0.1	2.6	2.1	8.6
Bullhead City	39,540	81.9	1.3	1.1	1.4	0.1	11.2	3.0	23.7
Kingman City	28,068	88.0	1.0	1.7	1.7	0.3	4.2	3.1	12.5
Dolan Springs CDP	2,033	90.7	0.8	1.1	0.5	0.1	4.5	2.3	11.4
Boulder City, Nevada	15,023	92.3	0.9	0.8	1.1	0.3	1.6	3.0	7.1
Mohave County	200,186	86.9	0.9	2.2	1.1	0.2	6.0	2.7	14.8
State of Arizona	6,392,017	73.0	4.1	4.6	2.8	0.2	11.9	3.4	29.6
United States	308,745,538	72.4	12.6	0.9	4.8	0.2	6.2	2.9	16.3

SOURCES:
U.S. Census Bureau 2010 Census. *2010 Census National Summary File of Redistricting Data, Tables P1, P2, P3, P4, H1.*
U.S. Census Bureau 2010 Census. *2010 Census Redistricting Data (Public Law 94-171) Summary File, Tables P1, P2, P3, P4, H1.*
NOTES:
[a] These may belong to any race.
ACRONYMS: AIAN – American Indian and Alaska Native; NHOPI – Native Hawaiian or Other Pacific Islander.
The geographic divisions of Census Tracts and Block Groups for demographic data are based on the 2010 Census (Figure 3-6(b)). Therefore, the units in this table differ from those presented in Table 3-20 (Figure 3-6(a)) for economic data from the 2005-2006 American Community Survey, which are based on Census 2000 geographic unit boundaries and divisions.

In Arizona, Whites account for only 73 percent of total population based on 2010 Census, while Hispanics/Latinos make up about 29.6 percent. The populations of Some Other Races, AIANs, Blacks or African Americans, Two or More Races, Asians, and NHOPI account for 11.9 percent, 4.6 percent, 4.1 percent, 3.4 percent, 2.8 percent, and 0.2 percent of the State's population, respectively, in 2010.

3.12 VISUAL RESOURCES

3.12.1 Introduction

The analysis area for the assessment of existing conditions for visual resources included all lands located within a 20-mile radius of the proposed Project (Map 4-1). According to BLM distance zones, distances greater than approximately 15 miles are considered “seldom seen”; however, a 20-mile analysis radius was used because of the large acreage of the Project and the nearly 500-foot high turbines with rotating blades. This geographic area includes the communities of Dolan Springs and White Hills, and public lands administered by the BLM Colorado River District (KFO), Reclamation, and the NPS. Bureau of Land Management-administered lands include the Mount Wilson and Mount Tipton Wilderness Areas. Lands administered by the NPS include the Lake Mead NRA, bisected by the Colorado River, and the proposed Greggs Hideout Wilderness.

3.12.2 Methods

Existing conditions within the Project Area were defined, in part, by the visual resource inventory (VRI) class and component VRI data established during the VRI of lands administered by the KFO prior to 1990. Planning-level data on visual sensitivity and distance zone were refined to indicate Project-level conditions based on input from interagency coordination, tribal consultation, and scoping. A Project-level assessment of the intensity and distribution of night lighting and motion within the analysis area was also conducted to better understand these elements of existing scenic quality.

Key Observation Points (KOPs) representing common views, sensitive receptors, special features, and/or landscape features were established from within the Project viewshed. The landscape character of each KOP was described for views toward the Project Area. Landscape character was described in terms of the basic visual character elements of form, line, color, and texture, and included a discussion of analysis factors such as scale (size relationship, proportion), dominance (attraction, visibility), distance from the Project, predominant angle of observation, dominant use (i.e., recreation or travel), and average travel speed of a viewer from which the Project would be viewed. Project-level information on scenic resources was used to inform design options to avoid or reduce potential impacts to visual resource that may result from operation of the proposed Project. Collectively, VRI and Project-level data served as the baseline for the visual resource impact analysis presented in Chapter 4.

3.12.3 Regulatory and Management Framework

Regulation and management of visual resources within the analysis area is directed at the Federal and local level. The Arizona State Land Department does not apply visual resource management provisions to State Trust lands. Management of visual resources at the local level is directed by the Mohave County General Plan, which identifies US 93, between Pierce Ferry Road and the Colorado River, as a Scenic Route (Mohave County 2010). This section of US 93 is situated west of the Project Area. Management goals associated with the Scenic Route apply to lands located within 1 mile of the highway, and include certain restrictions, such as prohibiting billboards.

Management of visual resources of the public lands is established by the following Federal law:

> ***National Environmental Policy Act (NEPA)(42 U.S.C. 4371)*** -- NEPA Section 101(b)(2) states that it is the “continuous responsibility” of the Federal government to “use all practicable means” to “assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.” Section 1502.6 states that EISs should be prepared using an “interdisciplinary approach which will ensure the integrated use of natural and social science and environmental design arts” (Section 102(2)(A).

The analysis area includes public lands administered by three Federal agencies: BLM, Reclamation, and NPS (Lake Mead NRA). Reclamation-administered lands are managed per *Reclamation Manual Directives and Standards* (Reclamation 2002). Reclamation does not have management objectives for visual resources or area specific management plans for the Project Area. The Lake Mead NRA is administered per Public Law 88-639, which states that Lake Mead NRA shall be administered for public recreation "... in a manner that will preserve the scenic, historic, scientific, and other important features of the area ..." The NRAs General Management Plan also states that "Preserving the high visual qualities of the area is integral to preserving the high quality of the recreation experience" (NPS 1986).

The BLM visual resource management policy identifies a basic stewardship responsibility to identify and protect visual values on all BLM-administered lands. This policy is described in the *Federal Land Policy and Management Act*, the *Land Use Planning Handbook* (BLM 2005c) and VRM System (BLM 1986), described below:

- ***Federal Land Policy and Management Act*** **–** Section 102 (a)(8) of the FLPMA of 1976 states that "the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values…"
- ***Land Use Planning Handbook*** **–** The BLM *Land Use Planning Handbook* (BLM 2005c) states that VRM management classes shall be designated for all BLM-administered land based on consideration of visual resource inventory data and management considerations for other land uses. Resource use and management activities shall be managed according to the VRM objectives established in the land use plan.
- ***Visual Resource Management System*** **–** Visual resources on BLM-administered lands are managed per the VRM System (BLM 1986). The VRM System is composed of three parts: The VRI, planning for visual resource management through assignment of VRM Classes, and Plan implementation/project analyses using the Visual Resource Contrast Rating System.

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

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

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

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

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

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

The Contrast Rating System can also reveal effective mitigation solutions for reducing visual contrasts for projects that are in conformance with VRM Class Objectives, as required under VRM policy.

The proposed Project is located within lands managed per VRM Class IV Objectives in the Kingman RMP (Map 19, Page 81) (BLM 1995). This VRM standard is based on a VRI completed before 1990. The BLM VRI and VRM designations do not apply to private, state, or other public lands within the KFO administrative boundary. However, inventory values and classes, and the Contrast Rating System, are generally accepted as methods to objectively evaluate visual landscapes and the potential impacts of proposed projects.

3.12.4 Existing Conditions

3.12.4.1 Landscape Character

The Project Area is located within the transition zone of the Sonoran and Mohave Deserts, both of which are situated in the Basin and Range Physiographic Province. The Basin and Range Physiographic Province is characterized by long, isolated, roughly parallel north-south oriented mountain ranges separated by broad, flat, desert basins (Fenneman 1931). The landforms within the region are a result of geologic uplift and erosion. The most prominent features in the region include the numerous mountain ranges, including the Black, Senator, Iron, and Table Mountains, Squaw Peak, Mount Perkins, and Mount Tipton, and the prominent water bodies of Lake Mead and the Colorado River. The Black Mountains are located west of the Project Area, along the east side of the Colorado River. The mountains and valleys of the area are dissected by erosional features that form vast plains and steep drainages, such as Gold Basin on the eastern side of the Project Area. Exposed rock faces and outcrops are common in this landscape, particularly along mountain escarpments and canyon walls. The landscape is panoramic, and expansive vistas of distant mountains are common. From the inferior position of lower elevation viewpoints, mountainous features appear massive, steep, and pyramidal. These features create dominate horizontal and shallow diagonal lines that characterize the horizon, and are often silhouetted against the open sky.

The Project Area is part of the "Creosote Bush-Dominated Basins" ecoregion that occurs in the Mohave Desert at elevations ranging from 1,800 to 4,500 feet. Creosote bush forms the dominant vegetation matrix in the Project Area, particularly at lower elevations. The Project Area also includes sparse white bursage, cacti, yucca, ephedra, salt brush, and Indian rice grass. These short and regularly spaced shrubs are medium to coarsely-textured and display muted hues of olive green and browns across the alluvial plains and rugged terrain of the Project Area. Trees and shrubs (i.e., Mohave Yucca, Joshua Trees) are mixed with sagebrush at higher elevations, increasing the color and texture contrasts compared to the monotone flats at lower elevations. The low lying shrubs can appear monotonous in color and texture when evenly spaced, especially with the muted olive color tones found in the surrounding vegetation.

The Project Area is located between the cities of Kingman, Arizona and Las Vegas, Nevada. The Town of Dolan Springs is located approximately 14 miles southeast of the Project boundary. The White Hills community is located from 1/2 to 1-3/4 miles south of the Project, depending upon the alternative. Nearby transportation corridors include US 93 and Temple Bar Road, both located west of the Project Area, and Pierce Ferry Road, located to the east. Frequent OHV use of the Project Area has resulted in small two-track roads throughout the Project Area, and visible scars on the landscape. Development in vicinity of the Project Area includes vertical radio broadcasting antennae, meteorological towers, and electric transmission lines, service roads for the transmission lines, and a mineral material pit and access road.

3.12.4.2 Visual Resource Inventory Class

Information on VRI values, including scenic quality, visual sensitivity, and distance zones is provided below.

Scenic Quality

Scenic quality is defined as the visual appeal of a tract of land (BLM 1986). Scenic quality of BLM-administered lands is determined through the VRI process. This process entails dividing the landscape into Scenic Quality Rating Units (SQRUs) based on conspicuous changes in physiography or land use, and ranking scenic quality within each SQRU based on the assessment of seven key factors, including: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modification. Each key factor is scored, and the value of each is added to derive an overall score for the unit. Based on these results, each SQRU is assigned a scenic quality rating of A, B, or C, with A representing the highest scenic quality, and C representing the lowest scenic quality.

The Project Area is located in SQRU 14 and SQRU 41, established during the pre-1990 VRI for the KFO. The Project Area occupies approximately 2 percent of SQRU 14 (20,299 acres), and 20 percent of SQRU 41 (26,766 acres). Because SQRU 14 includes lands designated as Wilderness (i.e. VRM Class I), the total acres of SQRU 14 managed as VRM Class IV is overestimated. The actual portion of SQRU managed as VRM Class IV was not calculated as part of this analysis. The VRI for scenic quality of lands within both SQRUs was ranked as Class C (Map 3-10).

Viewer Sensitivity

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

- *Type of Users* – Visual sensitivity is expected to vary by type of user. For example, recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.
- *Amount of Use* – Visual sensitivity is expected to vary by amount of use. For example, areas seen and used by large numbers of people are potentially more sensitive. Protection of visual values usually becomes more important as the number of viewers increase.
- *Public Interest* – The visual quality of an area may be of concern to local, state, or national groups. Indicators of this concern are usually expressed in public meetings, letters, newspaper or magazine articles, newsletters, land-use plans, or public controversy created in response to proposed activities that is perceived to result in change to the landscape character.
- *Adjacent Land Uses* – The interrelationship with land uses in adjacent lands can affect the visual sensitivity of an area. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be visually sensitive.
- *Special Areas* – Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas frequently require special consideration for the protection of the visual values. This designation does not necessarily indicate high scenic quality, but rather the potential for management objectives to be aimed at preservation of the natural landscape setting.
- *Other Factors* – Additional information, such as research or studies that includes indicators of visual sensitivity, should be included in the sensitivity level analysis when available.

Visual sensitivity within the Project Area was defined as moderate in the western half (SLRU 14), and low for the eastern half (SLRU 41) during the pre-1990 VRI for the KFO (Map 3-10). The boundaries of the SLRU coincide exactly with those defining the SQRUs in the Project Area.

Information on visual sensitivity was refined based on input received through interagency coordination, tribal consultation, and scoping meetings. Based on this information, the following site-specific assumptions of visual sensitivity were applied:

- Visual sensitivity of recreators within the Lake Mead NRA was assumed to be high. Approximately 29 percent of the NRA within a 20-mile radius of the Wind Farm Site is located in the Alternative A viewshed (Map 4-1).
- Visual sensitivity of residents within community of White Hills was assumed to be high based on prolonged views of the Project Area from residences.
- Visual sensitivity within SQRU 41 was assumed to be high for Hualapai tribal members based on the presence of their Traditional Cultural resources.

Visual sensitivity along Temple Bar Road (outside the NRA) and along US 93 is not expected to deviate from that described by the VRI as moderate. Travelers are moving approximately 50 miles/hour on Temple Bar Road with the purpose of reaching the recreation destination of Lake Mead.

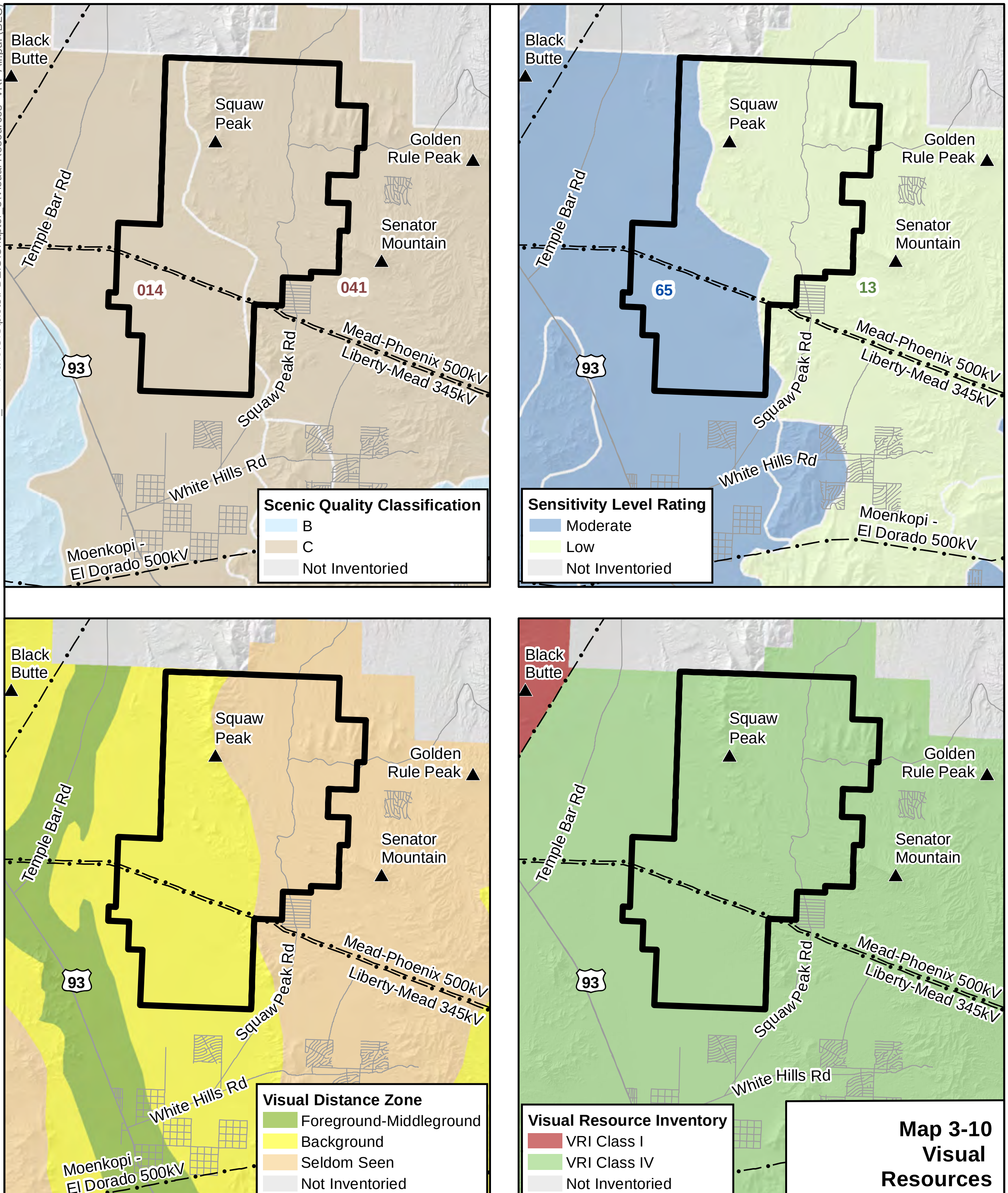
Distance Zones

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

- *Foreground-Middleground.* This is the area that can be seen from a particular location to a distance to 5 miles. The outer boundary of this distance zone is described as the point where the texture and form of individual plants are no longer apparent in the landscape. In some areas, atmospheric conditions can reduce visibility and shorten the distance normally covered by each zone.
- *Background.* The background includes locations that can be seen between a distance of 5 and 15 miles. The background zone does not include areas in the background which are so far distant that the only thing discernible is the form or outline. In order to be included within this distance zone, vegetation should be visible at least as patterns of light and dark.
- *Seldom-Seen Zone.* These are areas that are generally not visible within the foreground-middleground and background, or portions which are visible but beyond the background distance of 15 miles.

Based on the VRI completed during the pre-1990 VRI for the KFO, distance zones of the Project Area are described as background for the western half and seldom seen for the eastern half (Map 3-10).

The results of combining the SQRU value of C, with the SLA values of high and moderate, with the Distance Zones of background and seldom seen culminated in the Project Area being classified as VRI Class IV in the pre-1990 inventory (Map 3-10).



Mohave County Wind Farm Project

Legend

- Wind Farm Site*
- Existing Transmission Line
- Road
- Mountain Summit

*The lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

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NATIONAL SYSTEM OF PUBLIC LANDS

Source:
Visual Resource data: BLM Pre-1990s
Base Map: BLM 2009-2011, ALRIS 2007-2008, ESRI 2008, NHD 2008,
Project Area Boundary and Facilities: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)

P:\ENVPLANNING\BP Wind AZ\23445692_BPMohave\GIS\plots\PDEIS\Chapter_3\Visual Resources_VRI_All.pdf (BLC)

3.13 PUBLIC SAFETY, HAZARDOUS MATERIALS, AND SOLID WASTE

3.13.1 Introduction

This section discusses the affected environment of the Project Area related to public safety and health; the presence of hazardous materials and wastes; and the presence of solid waste.

3.13.1.1 Data Sources and Collection Methods

A Preliminary Initial Site Assessment (PISA) was conducted in August 2010 (URS Corporation [URS] 2010b). A Phase I limited site reconnaissance was conducted of the BLM-administered public lands on October 8, 2009, and on July 1, 2010, a second site reconnaissance was conducted on Reclamation-administered Federal lands as well as for transmission line interconnection site alternatives that have since been eliminated from detailed analysis. Revised Project footprints for Alternatives A, B, and C were established in June 2011 that included additional lands located in Sections 1, 12-13, and 23-27 of Township 28 North, Range 21 West; Sections 5-8, 12, 17-20, and 28-33 of Township 28 North, Range 20 West; and Sections 3-6, 10, 14, 22, 26-27, and 34 of Township 27 North, Range 20 West. No physical site reconnaissance was conducted on these additional areas.

Because the Project Area encompasses mountains, ridges, and washes, a four-wheel drive vehicle was used to traverse existing roads, trails, and drivable washes during the site reconnaissance visits. In some instances, a walking reconnaissance was conducted of areas not accessible by vehicle. Due to the vast size of the Project Area, not every portion of the Project Area was physically inspected. However, taking into consideration the current and historical use of most of the site (undeveloped), no major environmental concerns in the areas that were not physically inspected are anticipated.

3.13.1.2 Agency Coordination

In addition to physical observations of the Project Area, a preliminary regulatory database review of readily available public sources was conducted to identify the potential for hazardous materials concerns within the Project Area. For the analysis, the most current available information was gathered from Federal (USEPA) and state (Arizona) environmental databases and included: (a) known or potential hazardous waste sites or landfills; (b) sites currently under investigation for environmental violations; (c) sites that manufacture, generate, use, store, and/or dispose of hazardous substances or hazardous wastes; and (d) sites with recorded violations of regulations concerning underground storage tanks (USTs) and hazardous substances or petroleum products. The purpose of this task was to identify database listings present within the Project Area or on adjoining land that may have the potential to impact the environmental condition of the defined Project Area. Regulatory information on most of the Project Area was included in the August 2010 PISA. However, for those areas not physically accessed during the site reconnaissance visits (see Section 3.13.1.1 above), an agency records search was conducted on June 1, 2011.

Information on abandoned mine sites within the Project Area was gathered from publicly available websites and USGS MRDS website (USGS 2010).

3.13.1.3 Regulatory Guidance

Hazardous waste is defined by the Resource Conservation and Recovery Act (RCRA) and includes lists of specific wastes, as well as waste that exhibits a specific characteristic (e.g., it is ignitable, corrosive, reactive, or toxic in accordance with RCRA-specific definitions). For the purpose of this study, however, hazardous wastes and substances are defined herein as wastes or substances from production or operation activities that pose a substantial present or potential hazard to human health and the environment if improperly treated, stored, or disposed. The USEPA uses the term hazardous substance for chemicals that, if released into the environment above a certain amount, must be reported and, depending on the threat to the environment, Federal involvement in handling the incident can be authorized under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The ADEQ implements both RCRA and CERCLA as it has been granted primacy by the USEPA for both programs.

3.13.2 Regional Overview

The Project Area consists of natural desert and mountain land crossed by unimproved access roads and ephemeral washes. The vegetation consists of grassland and low-lying bushes throughout. There are numerous dirt roads, jeep trails, and washes bisecting the Project Area. Two high voltage transmission lines (Mead-Phoenix 500-kV and Liberty-Mead 345-kV) trend northwest to southeast through the southern portion of the Project Area. The proposed Project could interconnect with either one of these lines.

3.13.3 Existing Conditions

3.13.3.1 Public Safety and Health Issues

Due to the remote location, rugged terrain, and extreme temperatures of the Project Area, safety issues could exist for visitors to the area, including construction and maintenance workers. The presence of venomous snakes and desert animals also could pose a threat to visitors.

Abandoned mine sites can present safety issues to individuals visiting the Project Area and there is a possibility that abandoned mines could exist. However, no abandoned mine sites were observed during the field reconnaissance for this Project. Unsafe conditions could yield a public safety risk should some unseen mine sites exist. Some visitors find abandoned mines and prospects attractive to explore and may be exposed to, and unaware of, the following hazards at these sites:

- open and unstable shafts, adits, drifts, pits, tailings piles, wells, or other excavations
- dilapidated and unstable buildings or other structures
- collapsed buildings or other structures
- mining implements or construction debris
- hazardous or toxic materials

The pathogenic fungi that cause coccidioidomycosis, also known as valley fever, are prevalent in Arizona and could be a potential health concern for visitors or nearby residents. Coccidioidomycosis, commonly referred to as valley fever, is caused by *Coccidioides immitis* and *C. posadasii*, two species of fungi commonly found in southwestern United Sites, particularly Arizona and California, and northwestern Mexico. In the United States, Arizona has the highest number of reported cases, accounting for 60% of all national cases (Hector et al. 2011). For the year 2007, a total of 4,832 (75 per 100,000 residents) cases of valley fever were reported from across all 15 counties in Arizona. The highest rates of reported cases of valley fever in Arizona occur in Maricopa, Pinal, and Pima counties (Arizona Department of Health Services 2008). Table 3-24 summarizes the reported valley fever cases in Arizona by county. The Project is not located in the areas of highest incidence, but is still within the endemic valley fever region. In 2007, Mohave County had 50 reported cases (25 per 100,000) compared to 3,459 (89 per 100,000) in Maricopa County, 904 (90 per 100,000) in Pima County, and 256 (87 per 100,000) in Pinal County.

Table 3-24 2007 Reported Valley Fever Cases in Arizona by County of Occurance

County	Total Cases	Cases per 100,000 Residents
Maricopa	3,459	89
Pima	904	90
Pinal	256	87
La Paz	15	69
Graham	24	66
Gila	15	27
Mohave	50	25
Greenlee	2	24
Cochise	32	23
Yuma	13	6
Yavapai	26	12
Navajo	11	10
Santa Cruz	7	15
Coconino	13	10
Apache	5	7

SOURCE: Arizona Department of Health Services 2008.

The fungi that cause valley fever grow in the top 2 to 8 inches of soil in semi-arid parts of the Southwestern United States (Hector et al. 2011). As stated by the Valley Fever Center for Excellence (VFCE), even in endemic regions, the distribution of fungi in soil is not uniform and seems to occur in localized areas. Thus, most acreage appears not to contain the fungus. Therefore, occasional disturbance of soil often does not produce an increased risk of exposure (VFCE 2012). Conversely, windy conditions, which typically involve large areas of the desert, may be more likely to result in the spores becoming airborne and distributed across urban and rural areas (VFCE 2012). The implication is that exposure to the fungi is more associated with living in or visiting endemic areas than with engaging in activities associated with heavy dust exposure (VFCE 2012).

Exposure to the fungi occurs when the spores become airborne, typically during the dry seasons, and are inhaled, and when inhaled, can produce acute pulmonary infection in humans. However, sixty percent of people infected with the fungus will not display any symptoms or will only display mild respiratory symptoms. The remaining 40 percent of infections result in symptomatic disease, typically arising one to four weeks after exposure, which can resemble ordinary influenza, with fever, cough, fatigue, dyspnea, headache, myalgia and arthralgia (Hector et al. 2011 and VFCE 2012). Most cases of infections resolve after six months without specific course of treatment (VFCE 2012) and result in lifelong immunity (VFCE 2012). Five percent of infections result in serious complications of the lungs, including the development of nodules or cavities in the lung (VFCE 2012). Less than 1 percent of infections disseminate to other organs of the body (VFCE 2012). Meningitis is the most serious complication of dissemination and can result in death. The elderly and immunosuppressed people are at greatest risk of complications from valley fever.

3.13.3.2 Hazardous Materials

While a number of mining claims are filed within 20 miles of the Project Area, there are no mining claims filed within the Project Area according to a review of the BLM LR2000 database. No active mining operations are known to exist in the area. One abandoned mine site exists in the northeast portion of the Project Area. This inactive site, known as the Muscovite Mica mine, is shown on the Senator Mountain NE Arizona, 7.5-minute Topographic Quadrangle Map as an Open Pit Mine (USGS 1989). Cut hillsides observed during the site reconnaissance indicated the existence of this formerly mined area. No structures, remnants of structures, or equipment were observed at the site, and no evidence of hazardous materials was observed.

Other closed mine sites, prospect sites, and other mineral features are located near the Project Area. The area with the most significant mining activity is approximately 10 miles southwest of the center of the Project Area in the White Hills Mineral District. This area has approximately 20 closed mines and one prospect site that are mainly mined for gold and silver with some beryllium. About 8 miles south of the Project Area is one prospect site of uranium, lead, and zinc. The Project Area is located within an area where all Federal minerals are available for mining, but it is an area of low favorability for mineral mining. According to the BLM mineral database, the Project Area is not in a mining district and there are no active mining claims.

Potential hazards from dumping of hazardous material in old mine shafts exist; however, no official incidents have been recorded. Mine tailings located at closed mine sites are potentially hazardous because chemicals in the tailing piles can potentially leach into soils and/or groundwater or become airborne hazardous wastes.

During the site reconnaissance, no chemicals, chemical containers, or stained soil were observed within the Project Area. In addition, no evidence of dumped petroleum waste was observed in the Project Area during the site visits. No indications of potentially hazardous materials, such as electrical transformers, were observed associated with the transmission lines within the Project Area.

Information available on-line through ADEQ was reviewed for evidence of the potential for hazardous materials concerns within the Project Area. The on-line service identified and mapped sites within the categories identified in Table 3-25:

Table 3-25 Number of Sites in Project Area by Environmental Database Category

Environmental Database	Description of Database	Number of Sites*
WQARF	A Water Quality Assurance Revolving Fund (WQARF) area, which is also referred to as a state Superfund area, is a region designated by Arizona Department of Environmental Quality (ADEQ) for further investigation regarding environmental concerns. This designation typically is based on known areas of groundwater contamination, or past or present land uses that have been known to use and discharge chemicals that can contaminate groundwater.	0
RCRA TSDs	U.S. Environmental Protection Agency (USEPA) Resource Conservation and Recovery Information System (RCRIS) identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRIS Treatment, Storage, Disposal (TSD) Facilities List is a compilation by USEPA of reporting facilities that generate, transport, store, treat, or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) but are not undergoing any "corrective action."	0
RCRA Generators	RCRA-regulated hazardous waste generator notifiers list; both Large and Small Quantity Generators are included in this list.	0
SWLF	State inventory of solid waste disposal and landfill sites.	0
LUST	List of information pertaining to all reported leaking underground storage tanks (LUSTs).	0
UST	State underground storage tank sites listing. The State of Arizona requires that owners of most underground storage tanks (USTs) register their USTs with ADEQ.	0

Environmental Database	Description of Database	Number of Sites*
DEUR	A Declaration of Use Restriction (DEUR), previously known as Voluntary Environmental Mitigation Use Restriction (VEMUR), is a restrictive use covenant which accompanies the title to the land. It is required by ADEQ when a property owner elects to (1) remediate contamination found on the property to a non-residential use level, or when (2) an institutional or engineering control remains as a means to meet remediation goals.	0

* Number of sites identified by ADEQ within the boundaries of the Project Area.

3.13.3.3 Solid Waste

Solid waste dumping, commonly referred to as wildcat dumping, refers to the disposal of hazardous and non-hazardous waste. Episodes of dumping range from abandonment of household trash and appliances to vehicles, equipment and personal items. Typical examples of wildcat dumping observed during the site reconnaissance visits to the Project Area included several discarded vehicles, a large truck, and a boat. In addition, a water tank and remnants of a corral area were observed at another location within the Project Area. While unsightly, no environmental issues associated with this discarded equipment were identified.

3.14 MICROWAVE, RADAR, AND OTHER COMMUNICATIONS

3.14.1 Introduction

This section addresses the affected environment of the Project in relation to civilian and military air traffic control radar and microwave communications. Publicly available data from the FAA, Department of Defense (DOD), Federal Communications Commission, and preliminary studies conducted by the Project proponent have been reviewed and are summarized in this chapter.

The FAA is authorized under Title 14 CFR Part 77 to review and approve the installation or construction of structures in the United States that exceed 200 feet in height or that would otherwise have the potential to affect the safety of civilian or military air navigation. Most modern wind turbines reach heights greater than 200 feet and as such would require FAA approval prior to installation.

Once the final wind turbine locations are determined, the Project proponent must submit the Notice of Proposed Construction or Alteration Form 7460-1 and supporting documents to the FAA through the web-based Obstruction Evaluation/Airport Airspace Analysis portal (FAA 2010a). The FAA would then conduct aeronautical studies with cooperation from the relevant DOD branches to formally evaluate the likely impacts from the Project’s wind turbines on radar and flight. If no likely impacts are identified, the FAA issues the Determination of No Hazard to Air Navigation for each individual wind turbine, and construction may proceed subject to the review and approval of other regulatory agencies.

A national Memorandum of Understanding between the BLM and DOD completed in July 2008, “Wind Energy Protocol between the Department of Defense and the Bureau of Land Management Concerning Consultation on Development of Wind Energy Projects and Turbine Siting on Public Lands Administered by the Bureau of Land Management to Ensure Compatibility with Military Activities,” specifies coordination protocols including timeline and process for projects such as the Mohave County Wind Farm.

3.14.2 Regional Overview

The Project Area is located 215 miles northwest of Phoenix, Arizona, and 240 miles north of the Arizona-Mexico border. The nearest identified long-range radar system is located approximately 45 miles to the northwest at Las Vegas, Nevada. The nearest weather radar site is located near Boulder City, Nevada, approximately 35 miles to the west of the Project Area. The nearest microwave communication system path is located 4 miles southwest of the Project Area near the intersection of US 93 and White Hills Road. All known radar and microwave communication facilities within 50 miles of the Project Area have been considered in this section.

3.14.3 Existing Conditions

3.14.3.1 Long Range Military Radar/Military Areas of Operation

The installation and operation of wind turbines has the potential to interfere with long-range radar systems used for civilian and military air traffic control. The FAA in cooperation with the DOD has developed the web-based DOD Preliminary Screening Tool (Tool) that enables developers to obtain a preliminary review of potential impacts to long-range and weather radars, military training routes and special airspace prior to official filing (FAA 2010b). The Tool is only a preliminary assessment to assist developers during the planning process and does not replace the detailed aeronautical studies required by the FAA upon filing of a project Notice of Proposed Construction or Alteration Form 7460-1.

For long range radar, the Tool classifies a project site as Red, Yellow, or Green. A Red classification signifies that it is highly likely that the project would impact air defense and homeland security radars and that an aeronautical study would be required. A project with a Yellow classification would likely impact air defense and homeland security radars and an aeronautical study would be required. The Green classification signifies that there is no anticipated impact to air defense or homeland security radars, but an aeronautical study would still be required. The Tool assesses the likelihood of impacts to weather radar in a similar fashion with a Red, Yellow, or Green project classification.

The Tool also assesses military operations that are not radar related including impacts to special airspace and training routes. The Tool returns a result of either impacts being likely or not likely to Military Airspace, and provides personnel contacts and telephone numbers for each specific military branch.

The Wind Farm Site has been analyzed using the DOD Preliminary Screening Tool (Appendix F) for long-range radar, weather surveillance radar-1988 Doppler radars (NEXRAD), and military operations. Depending on the turbine model used, the turbine hubs would be between 262 feet (80 meters) and 345 feet (105 meters) above the ground, and the turbine blades would extend between 126 feet (38.5 meters) and 194 feet (59 meters) above the hub. At the top of their arc, the blades would be between 390 feet (118.5 meters) and 539 feet (164 meters) above the ground. The wind turbines proposed for this Project would need to comply with Federal Aviation Regulations (FAR) Part 77 (FAA 2010b). The results indicate that a portion of the Project Area is classified as Yellow for long-range radar, and Green for weather radar. The nearest long-range radar facility is at Las Vegas, Nevada, and the nearest weather radar is near Boulder City, Nevada. The Tool did not identify the Project Area as being within an area of concern for military operations.

Project Team members periodically coordinated with the DOD via phone and e-mail primarily from October 2009 through July 2011 regarding potential impacts of the proposed wind turbines on military operations, particularly radar. A consultation letter was sent to the U.S. Navy Southwest Region in San Diego in October 2009 and the notice of intent to Luke Air Force Base in December 2009. The DOD (Nellis Air Force Base) took part in an FAA presentation on turbine lighting held at the BLM KFO and at the Project Area on September 27, 2011.

3.14.3.2 Federal Communication Commission Licensed Facilities

The installation and operation of wind turbines has the potential to interfere with the operation of microwave communication systems. Microwave communication uses a series of dish-or antenna-type stations to transmit telephone, video, digital, and other information. A typical example of a microwave communication system is a cellular telephone tower.

Electric and magnetic interference (EMI) is one of the most common problems in microwave communication. EMI can result from contact between microwave signals and metallic structures, such as house siding, large trucks, power lines, other microwave communication stations, and wind turbines.

A microwave study for the Project was conducted by Comsearch on August 25, 2011 (Comsearch 2011) (see Appendix E) to determine the potential for the Project to interfere with privately operated microwave beams under all of the action alternatives. A preliminary licensed microwave system search conducted by Comsearch identified three microwave telecommunication system paths near the Project Area (Comsearch 2006). The three microwave paths transect an area close to the intersection of US 93 and White Hills Road to the south of the Project Area. One microwave communication system is owned by CNG Communications, Inc., and two are owned by Citizens Utilities Rural Company, Inc. None of the identified microwave paths intersect the current Project Area.

Additionally, the Project proponent has requested the National Telecommunications and Information Administration (NTIA), which oversees Federal communication resources, to provide a review of the Project. The October 28, 2011 response from the NTIA indicates that after a 45-day period of review, no Federal agencies identified any concerns regarding blockage of their radio frequency transmissions. Any wind turbine that would potentially interfere with these microwave communication resources would require relocation or elimination from the Project.

On November 5, 2010, BP Wind Energy submitted to the FAA notices of proposed construction for 130 proposed wind turbines, based on the project footprint that was being evaluated at that time. The physical turbine measurements provided for the submittal were for one of the larger potential wind turbine models being considered for the Project. On January 31, 2011, the FAA responded with 130 Determinations of No Hazard, essentially approving all the turbines submitted. The cases are 2010-WTW-15553-OE through 2010-WTW-15682-OE, and may be viewed on the FAA Obstruction Evaluation website. When a wind developer proposes turbine installations, the FAA is required to circulate the request to all relevant civil and defense aviation offices that could reasonably be impacted by the Project.

In March 2013, BP Wind Energy submitted to the FAA notices of proposed construction for 208 proposed wind turbines based on the project footprint that is being evaluated at the current time. The physical turbine measurements provided for the submittal are representative of the turbines under consideration and may be modified in the future submittals. The FAA will once again circulate these applications to civil and defense aviation offices and will be responding in the coming months.

During final design, when turbine turbine counts, positions, and type (size) have been better established, BP Wind Energy would review the final design against the March 2013 filings and submit updated applications where necessary or terminate any of the March 2013 filings that would not be needed. FAA findings and any adjustments to the findings associated with final design would be provided to BLM and Reclamation.

3.14.3.3 Other Communication Signals

No other communication signals have been identified that would be affected by the installation of wind turbines at the Project Area.

3.15 NOISE

3.15.1 Introduction

3.15.1.1 Noise Fundamentals

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

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and may or may not be sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the pitch of the sound and is measured in cycles per second or is measured using a logarithmic scale. Sound intensity (a vector quantity) is defined as the sound power per unit area but when its direction is understood the magnitude is the value of interest. A sound level of 0 decibel (dB) is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above approximately 110 dB begin to be felt inside the human ear as discomfort and eventually pain at 120 dB and higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 1 to 2 dB. A 3 to 5 dB change is readily perceived. A change in sound level of about 10 dB is usually perceived by the average person with healthy hearing function as a doubling (or if decreased by 10 dB, halving) of the sound's loudness, even though the actual intensity change is an order of magnitude.

Due to the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically; however, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example: 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

Sound level is usually expressed by reference to a known standard. This section refers to sound pressure level (SPL), which can be measured by instruments and expressed as a pressure metric: force over a unit area, such as Pascals. In expressing SPL on a logarithmic scale, the sound pressure is compared to a reference value of 20 microPascals. SPL depends not only on the power of the source, but also on the distance from the source and on the acoustical characteristics of the space surrounding the source.

Hertz is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. When the drum skin vibrates 100 times per second, it generates a sound pressure wave that is oscillating at 100 Hertz (Hz), and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the best human ear.

Sound from a tuning fork contains a single frequency (a pure tone); however, most sounds one hears in the environment do not consist of a single frequency but rather a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that represents human hearing, which is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This is called "A-weighting," and the decibel level measured is called the A-weighted sound level (dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Although dBA may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the equivalent sound level (L_{eq}) may be used to describe sound that is changing in level. L_{eq} is the energy-mean dBA during a measured time interval. It is the "equivalent" constant sound level that would have to be produced by a given source to equal the acoustic energy contained in the fluctuating sound level measured. In addition to the energy-average level, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum L_{eq} (L_{max}) and minimum L_{eq} (L_{min}) indicators that represent the root-mean-square (RMS) maximum and minimum noise levels measured during the monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the acoustic floor for that location.

To describe the time-varying character of environmental noise, statistical noise descriptors such as L_{10}, L_{50}, and L_{90} are commonly used. They are the noise levels equaled or exceeded 10 percent, 50 percent, and 90 percent of the measured time interval, respectively. Sound levels associated with the L_{10} typically describe transient or short-term events. Half of the sound levels during the measurement interval are less than the L_{50} value and half are greater, while levels associated with L_{90} often describe background noise conditions and/or continuous, apparently steady-state sound sources.

Finally, another sound measure known as the Day-Night Average Sound Level (L_{dn} or DNL) is defined as the A-weighted equivalent sound level for a 24-hour day. As part of its derivation from hourly or representative daytime and nighttime SPL, the calculation of L_{dn} applies an additive 10 dB penalty to sound levels during the nighttime period (10 PM to 7 AM), which helps compensate for apparent increased sensitivity to noise during the quieter nighttime hours.

The L_{dn} value is typically used to define acceptable land use compatibility with respect to noise. Because of the time-of-day penalties associated with the L_{dn} descriptor, the L_{eq} for a continuously operating sound source during a 24-hour period will be numerically less. Sound levels of typical noise sources and environments are provided in Table 3-26 to provide a frame of reference.

Table 3-26 Sound Pressure Levels of Typical Noise Sources and Noise Environments

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Jet Fly-over at 1000 ft (300 m)	110-100	Rock Band
Gas Lawn Mower at 3 ft (1 m)	100-90	
Diesel Truck at 50 ft (15 m), at 50 mph (80 km/hr)	90-80	Food Blender at 3 ft (1 m)
Commercial Area, Gas Lawn Mower at 100 ft (30 m)	70	Vacuum Cleaner at 10 ft (3 m)
Heavy Traffic at 300 ft (90 m)	60	Normal Speech at 3 ft (1 m)
Quiet Urban Daytime	50-40	Large Business Office
Quiet Urban/Suburban Nighttime	40-30	Theater, Large Conference Room (Background)
Quiet Rural Nighttime	30-20	Library, Bedroom at Night, Concert Hall (Background)
	20-10	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	

SOURCE: Hendriks 1998

3.15.1.2 Laws, Ordinances, Regulations and Standards Summary

The following subsections describe laws, ordinances, regulations and standards (LORS) that are applicable to defining potential noise effects from the proposed Project.

Federal

There are no Federal LORS that directly affect this Project with respect to noise. However, there are guidelines at the Federal level that direct the consideration of a broad range of noise and vibration issues as listed below:

- NEPA (42 USC 4321, et seq.) (PL-91-190) (40 CFR § 1506.5)
- Noise Control Act of 1972 (42 USC 4910)
- U.S. Department of Housing and Urban Development Noise Guidelines 24 CFR § 51 subpart B
- NPS 2006 Management Policies, Section 4.9

The USEPA has published a guideline that specifically addresses issues of community noise (USEPA 1974). This guideline, commonly referred to as the "levels document," contains goals for noise levels affecting residential land use of L_{dn} <55 A-weighted sound level (dBA) for exterior levels and L_{dn} <45 dBA for interior levels. The U.S. Department of Housing and Urban Development Noise Guidebook Chapter 2 (24 CFR Section 51.101(a)(8)) also recommends that exterior areas of frequent human use follow the USEPA guideline of 55 dBA L_{dn}. However, the same Section 51.101(a)(8) indicates that a noise level of up to 65 dBA L_{dn} could be considered acceptable.

Occupational exposure to noise is regulated by Title 29, CFR, Part 1910.95, which describes that protection against the effects of noise exposure shall be provided when the sound levels exceed an average of 90 dBA for an 8-hour period. When employees are subjected to sound exceeding this limit, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within 90 dBA, personal protective equipment (PPE) shall be provided and used to reduce sound levels within the limits. The employer shall administer a continuing, effective hearing conservation program whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 dBA (measured via slow response). For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with 29 CFR 1910.95 Appendix A (noise exposure computation) without regard to any attenuation provided by the use of PPE.

In Section 4.9 of its *Management Policies* document (NPS 2006), the NPS describes the expectations of its park superintendents to identify unnatural sounds and their levels that might cause impacts. These policies do not enumerate either absolute or relative thresholds applying to noise generated from human activities adjacent to park lands.

State

For power plant projects, the Arizona Corporation Commission (ACC) is typically delegated authority to act as the lead agency for purposes of environmental noise compliance. As stated in the ACC Rules of Practice and Procedure R14-3-219:

> "*Describe the anticipated noise emission levels and any interference with communication signals which will emanate from the proposed facilities.*"

Chapter 4 of this draft EIS details anticipated Project construction and operation noise emission levels that could—if applicable—satisfy this ACC anticipated noise emission description requirement.

Local (Mohave County)

The Project Area and its environs include unincorporated areas within and governed by Mohave County. Project noise at any noise-sensitive receivers must comply with the County General Plan and the Zoning Ordinance (Mohave County 2008).

General Plan

The County's General Plan, Section V.A.5, describes noise regulations within Mohave County. Figure 3-7 presents the County's noise standards regarding maximum noise levels for various land use. Implementation Measures N2 describes:

> "*Require developments which generate off-site noise levels in excess of 65 dBA to mitigate noise to levels that do not exceed the County's standards.*"

Zoning Ordinance

The County's Zoning Ordinance, Section 27.S, describes Industrial Performance Standards pertaining to noise that include the following language.

Subsection C.2 states:

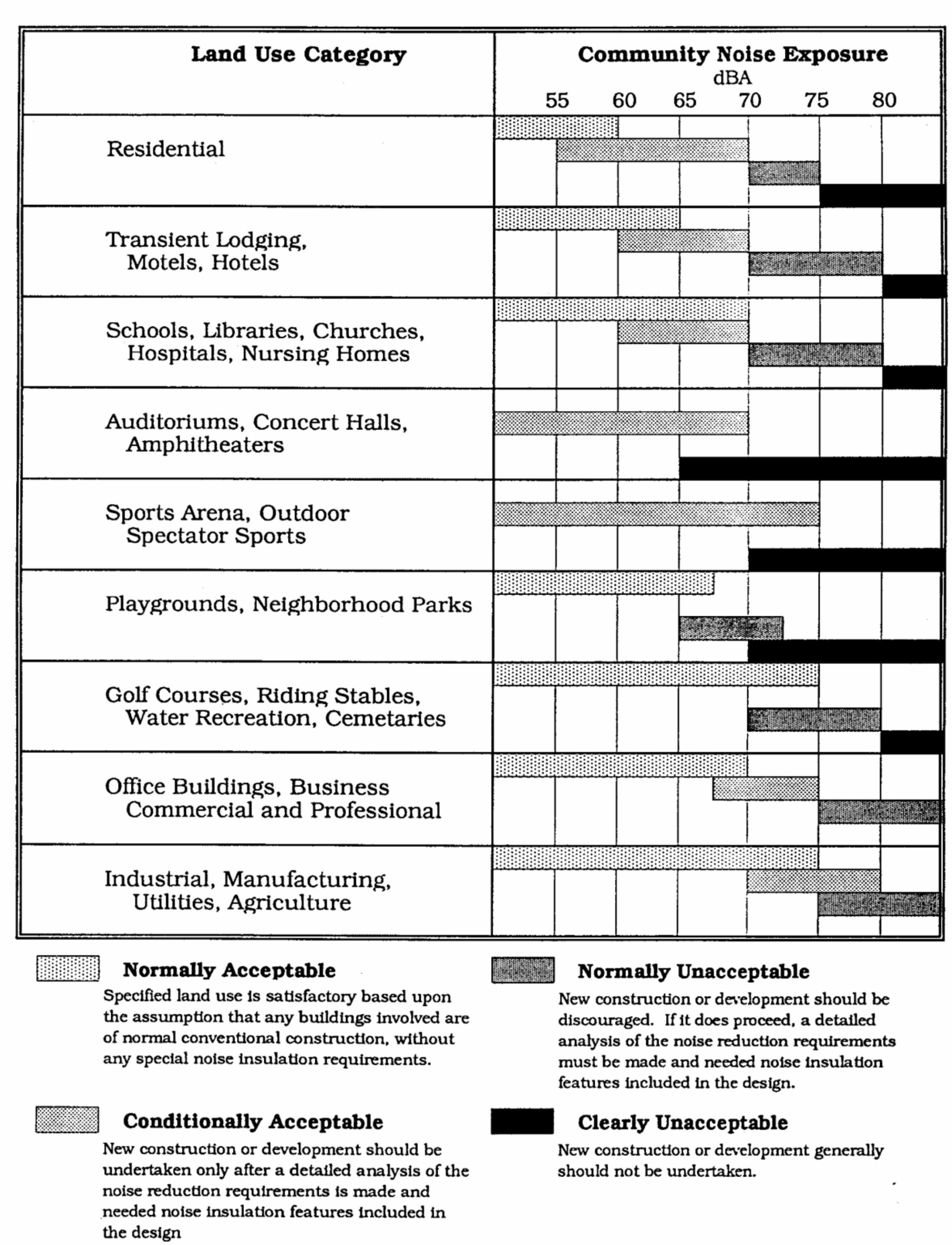
> "*Noise: at the boundary between the manufacturing district and residential districts, the maximum sound level radiated by any use or facility, other than transportation facilities, temporary construction work or safety relief systems shall not exceed the limits set forth in the following table:*"

"Table 1 Noise Limits

Octave Band (Cycles per Second)	37 75	75 150	150 300	300 600	600 1200	1200 2400	2400 4800	4800 9600	A Scale
Daylight decibel band limit (dB re 0.0002 microbar)	90	80	74	69	65	62	60	58	70
Nighttime decibel band limit (dB re 0.0002 microbar)	83	73	67	62	58	55	53	51	63

SOURCE: Mohave County 2008, Section 27.S, Subsection C.2."

Figure 3-7 Mohave County Noise Standards – Maximum Noise Levels for Various Land Uses



SOURCE: Mohave County 2005, Exhibit V.6.

Lake Mead National Recreation Area

There is no quantified noise threshold in Lake Mead NRA policies with respect to the assessment of potential noise impacts on recreational visitors and uses from noise sources external to park lands. In consideration of visitors that may elect to sleep outdoors in areas of Lake Mead NRA that are adjacent to the Project, NPS has recommended that a fixed guidance-based limit of 35 dBA nighttime (i.e., the nine hours between 10 p.m. and 7 a.m.) L_{eq} for Project-generated noise (exclusive of non-Project sound) be used in this EIS as an impact indicator for noise exposure with respect to Lake Mead NRA lands in the study area.

In support of its recommendation, NPS references Oregon Administrative Rules (OAR) 340-035-0035 Noise Control Regulations for Industry and Commerce. OAR 340-035-0035 sets forth maximum permissible environmental noise levels for new commercial and industrial development in relationship to "noise-sensitive property," defined as "real property normally used for sleeping, or normally used as schools, churches, hospitals or public libraries."

A relative criterion, such as the allowable increase over ambient established in OAR 340-035, could—under the right conditions—effectively produce a similar limit on Project-generated noise that would be compatible with the NPS recommended nighttime limit of 35 dBA. With respect to wind facility development on previously undeveloped lands, and up to predefined limits identified in "Table 8" of the administrative rule, OAR 340-035-0035 (b) (B) (iii) (V) establishes maximum permissible noise levels as actual ambient levels + 10 dBA. By way of example using OAR 340-035-0035 as an impact indicator, if measured background sound levels are 25 dBA, then 35 dBA would be the maximum ambient sound level that includes added noise from the Project. Since these values are 10 dBA apart, and based on the acoustical principle of logarithmic addition as mentioned in Section 3.15.1, one can reasonably assert that the larger of the two is essentially the noise from the Project.

When background sound level (i.e., ambient without the Project) is relatively low, such as this 25 dBA example, the resulting limit on Project noise using this kind of relative criterion (ambient + 10 dBA) will tend to be consistent with industry expectations and guidance that describe favorable conditions for sleep. But when the background level is relatively high, as will be discussed in Section 3.15.3, this kind of relative criterion (ambient + 10 dBA) risks enabling Project noise to far exceed the NPS suggested level considered compatible for those park visitors sleeping outdoors without the noise reduction benefit of a structure, such as a bedroom wall.

For this reason, and to be discussed in greater detail in Section 4.15.1, this EIS analysis uses the absolute 35 dBA nighttime Leq as a limit on Project-generated noise.

3.15.1.3 Methods

In order to characterize the pre-Project existing ambient sound environment at representative noise sensitive receivers near the proposed Project Area, long-term sound level measurements were conducted during a field survey from Monday, October 26, 2009 to Tuesday, October 27, 2009. Later, and performed independently by NPS, a 2011 multi-month survey was performed on Lake Mead NRA land at a single location near the Project northern boundary.

In the absence of such field surveys, the existing sound level environment in the vicinity of the proposed Project could be coarsely estimated with both roadway proximity and population density methods as published by the Federal Transit Administration (FTA) in its *Transit Noise and Vibration Impact Assessment* (FTA 2006b).

3.15.1.4 Field Surveys

A technical report titled "Noise and Vibration Study, Mohave County Wind Farm Project" (URS 2010d) describes the selected long-term ambient sound measurement locations and summarizes the collected data. The report, which is available upon request to the BLM KFO, presents a discussion of considerations with respect to the influence of ground wind speed on ambient sound measurement. The report lists reasons to support the usage and suitability of long-term measurement data (identified as LT3) to generally represent the ambient sound environment for land north of the Project—particularly Lake Mead NRA—and introduces "LAKE018," a measurement location selected and used by NPS for one of its recent long-term ambient sound level field surveys of the recreational area.

3.15.2 Regional Overview

The Project would be located within Mohave County, Arizona, approximately 40 miles northwest of Kingman, Arizona, approximately 9 miles south of the Colorado River, and approximately 20 miles southeast of Hoover Dam. The community of White Hills is located south of the proposed Project Area, with scattered residences identified as the noise sensitive receivers within its community. In addition, a few potential residential grids (i.e., layouts of unpaved roads and mostly undeveloped property parcels, some of which have had no further development activity for several years) have been identified to the east of the proposed Project Area.

3.15.3 Existing Conditions

3.15.3.1 Ambient Sound in the Proposed Project Vicinity

Table 3-27 reproduces a summary table from the Final Noise and Vibration Study Report of what are considered valid and representative ambient sound measurement.

Table 3-27 Noise Measurement Data Summary (dBA)

Site ID	Monitoring Date(s)	Start Time	End Time	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}	DNL	Temp. (°F)	RH (%)	Wind Speed Range (mph) & Direction
LT1	10-26 to 10-27-09	10:05	22:05	44	67	36	43	39	37	45	68	24	3-5 N→S
		22:05	1:05	36	49	36	37	37	36				
LT2	10-26 to 10-27-09	11:10	22:10	46	66	38	45	42	39	48	70	20	3-8 N→S
		22:10	1:10	40	59	38	41	39	38				
LT3	10-26 to 10-27-09	13:00	22:00	43	75	19	36	29	24	44	69	22	3-7 N→S
		22:00	23:00	35	49	22	38	34	29				

NOTES: LT = Long Term, DNL = Day-Night Average Noise Level, RH = Relative Humidity
Indicated Temperature, RH, and Wind Speed values were measured at the Start Time.

The noise survey performed by NPS in 2011 on Lake Mead NRA land just north of the Project Area at position LAKE018 was considerably longer in duration than the survey summarized in Table 3-27 and enabled the measurement of both ambient sound level and wind speed data—both at 1.5 meters (about 5 feet) above grade. Correlating this NPS collected data with available concurrent meteorological data suggests that daytime L_{eq} at LAKE018 (and, if considered representative, the portion of Lake Mead NRA land within 2 miles of the northern Project boundary) could be as low as 34 dBA when there would be calm conditions at wind turbine hub height (i.e., approximately 80 meters), and 24 dBA L_{eq} at night under similar conditions. But when the wind speeds at wind turbine generator (WTG) hub height are substantial (e.g., 10 meters per second), the measured ambient sound levels were 46 dBA L_{eq} and 38 dBA L_{eq} for daytime and nighttime, respectively. Considering all wind speeds, and factoring in the statistics during which they were measured to occur over the course of the multi-month-long survey performed by NPS, the daytime and nighttime L_{eq} values are 44 dBA and 35 dBA, which are very close to the measured L_{eq} values for LT3, the representative position closest to (but not on) Lake Mead NRA lands.

Using FTA ambient environmental noise prediction methods (FTA 2006a), predictions of existing ambient noise might range from 35 to 50 L_{dn} depending on distance to the nearby highway (US 93). The calculated L_{dn} values from measured A-weighted levels as appearing in Table 3-27, and L_{dn} similarly calculated from L_{eq} data from the NPS survey, would appear to be in agreement with this guidance.

Depending on the listener location in the vicinity of the Project, contributors to the measured and/or observed existing ambient sound level are likely to include the following:

- Distant passenger vehicle, bus and truck traffic on US 93.
- Typical residential land use activities, including but not limited to: yard work equipment, home improvement construction projects and usage of associated tools, amplified music, child play, dog barks, heating/ventilation/air conditioning equipment, etc.
- Commercial, civilian and military aircraft overflights, including both fixed-wing and rotary-wing vehicles.
- Wind-generated turbulence, resulting from wind interaction with vegetative ground cover and exposed rocky surfaces.
- Occasional off-road vehicle traffic, as permitted on either privately owned or BLM-administered lands, associated with recreational activities that use unimproved roads, which traverse the proposed Project Area. Such recreational activities could include, as permitted, discharge of firearms as part of target practice or hunting.
- Commercial and industrial (e.g., active mineral extraction and/or processing) activities that involve impulsive, intermittent or continuous electromechanical equipment operation. Pumps, refrigeration systems, and heating, ventilation and air-conditioning systems are usual noise generators.
- Residential and commercial road vehicle traffic on local roads, such as White Hills Road and the established streets of the White Hills community.
- Truck traffic that conveys extracted mineral materials from the extraction site to other locations, making usage of available routes such as Senator Road and White Hills Road. Such traffic, which seemed to occur with regular frequency and involving multiple trucks, was witnessed on these local roadways during the field survey. The mineral extraction site is active and located roughly southeast of the Project Area.

3.15.3.2 Surrounding Land Uses and Potential Noise-Sensitive Receivers

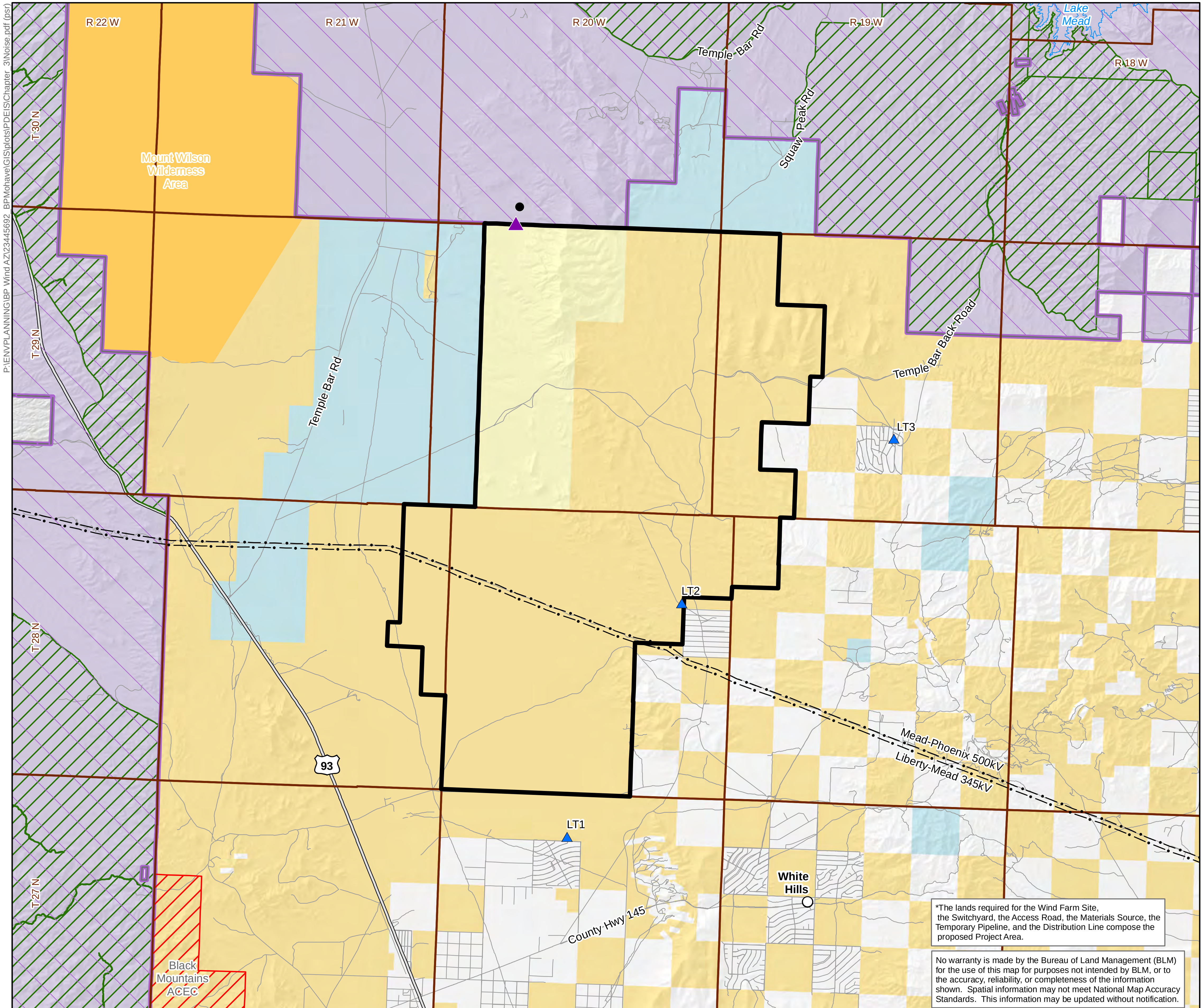
The potential noise-sensitive receivers discovered in and around the Project Area, such as those associated with the White Hills community and typified by the measurement location LT1 (see Map 3-11), include what appear to be occupied dwellings ranging from mobile homes to multi-story detached single homes built upon foundations. There is no known noise-sensitive area within 3 miles west of the proposed Project.

While noise regulations exist for recreational vehicles and equipment usage within the Lake Mead NRA that neighbors the Project to the north, there are no regulations or policies that describe absolute or relative numerical noise criteria with respect to noise entering the national recreation area from adjacent lands. Qualitatively, however, the potential noise sensitivity (i.e., expressed as preservation of the "natural soundscape") of appropriate park lands from such external noise sources is alluded to in Section 4.9 of the NPS Management Policies (NPS 2006) as follows:

> "Using appropriate management planning, superintendents will identify what levels and types of unnatural sound constitute acceptable impacts on park natural soundscapes. The frequencies, magnitudes, and durations of acceptable levels of unnatural sound will vary throughout a park, being generally greater in developed areas. In and adjacent to parks, the Service will monitor human activities that generate noise that adversely affects park soundscapes, including noise caused by mechanical or electronic devices. The Service will take action to prevent or minimize all noise that through frequency, magnitude, or duration adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified through monitoring as being acceptable to or appropriate for visitor uses at the sites being monitored."

3.15.3.3 Area Wildlife

The detailed description of the existing wildlife in the vicinity of the proposed Project Area is in Section 3.5.



*The lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Map 3-11 Sound Level Measurement Locations

Mohave County Wind Farm Project

Legend

- Wind Farm Site*
- National Park Service Lake Mead National Recreational Area Boundary
- Bureau of Land Management Area of Critical Environmental Concern (ACEC)
- National Park Service Proposed Wilderness

Noise Study Locations

- National Park Service Sound Level Measurement Location (LAKE018)
- Representative Lake Mead National Resource Area Boundary Noise Assessment Location
- Sound Level Measurement Location

Surface Management

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- StateTrust Land
- Private Land
- Bureau of Land Management Wilderness Area

General Features

- Community
- Existing Transmission Line
- U.S. Highway
- Road
- Township and Range Boundary
- Lake

Source:
Project Site Boundary: BPWE North America 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009
Measurement and LMNRA Locations, dBA Contours: URS 2009, 2010, 2011

NATIONAL SYSTEM OF PUBLIC LANDS

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter describes the environmental consequences, also referred to as impacts or effects, of implementing the alternatives. Considering the existing condition of the environment that would be affected by the Mohave County Wind Farm Project (Project) (Chapter 3) and imposing the descriptions of the alternatives (Chapter 2), the types of impacts were identified and quantified to the extent practicable for the purposes of this Environmental Impact Statement (EIS). Impacts are defined as modifications to the environment over existing conditions (the No Action Alternative) that are caused by a proposed action. Potential impacts considered in this chapter include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems) aesthetic, historical, cultural, economic, social, and health (40 Code of Federal Regulations §1508.8 [40 CFR §1508.8]) impacts. General impacts of wind energy facilities to resources and resource uses are described in the *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States* (Bureau of Land Management [BLM] 2005); this document is incorporated by reference.

The impact analysis is designed to show relative differences in alternatives as they pertain to specific resources, resource uses, or social and economic features. It is not intended to predict the exact amount, timing, or location of effects that could occur should the alternative be selected for implementation. The numbers generated and used for comparison of impacts are approximated and intended for analysis purposes only. The exact location of Project features cannot be determined until a final design is completed. Therefore, the exact areas of impact on specific resources, resource uses, or social and economic features are estimates based on the best available information at the time of this writing.

As discussed in Section 2.5, some project variables will not be determined until a decision is made on which alternative would be selected, and (if an action alternative is approved) the project moves into a final design stage. For example, selection of a specific turbine type is influenced by many variables including what turbines are being manufactured, and changing technology can influence turbine capabilities and construction techniques. Design parameters, including the placement of turbines and geotechnical constraints, may influence whether collector lines are buried or placed aboveground.

The marketing of the power generated provides an additional variable. The power purchaser would influence if it is more favorable to interconnect to the 345-kilovolt (kV) Liberty-Mead or the 500-kV Mead-Phoenix transmission line because of efficiencies gained by the natural directional flow of the power and the differing amount of power (425 megawatts [MW] or 500 MW) to be generated based on the interconnection agreements. In addition, securing power purchase agreement(s) creates a contractual obligation for the purchase of an established number of MW. If the full generation nameplate capacity of the Project is not contractually secured through one power purchase agreement, the Project could be built in two or more construction intervals as additional power purchase agreements are secured. This could increase the duration of construction. However, building in different intervals would not change the area where construction would occur as analyzed in this EIS.The potential for building the Project in two or more construction intervals is common to all action alternatives, and the effects would be similar for all action alternatives; therefore the effects are addressed in the construction effects associated with Alternative A only to avoid unnecessary repetition.

Some of the undetermined project variables have little influence on the resource analysis, but the analysis identifies when a variable could change the effects, and how the effects might differ. The ecology, data collection, and management of ecosystems are a complex and constantly evolving discipline. However, basic ecological relationships are well established, and a substantial amount of credible information about ecosystems in the study region is known. The alternatives were evaluated using the best available information about these ecosystems. While additional information may add precision to estimates or better specify relationships, new information would be unlikely to appreciably change the understanding of the relationships that form the basis for the evaluation of effects.

The depth and breadth of the impact analyses presented in this chapter is commensurate with the level of detail presented in Chapter 3, and on the availability and/or quality of data necessary to assess impacts. The potential impacts of Alternatives A, B, C, D, and E (Agencies' Preferred Alternative), and discussions of cumulative impacts, are described in this chapter using the same order of resource topics presented in Chapter 3. The organization for Chapters 3 and 4 allows the reader to compare existing resource conditions (Chapter 3) to potential impacts (Chapter 4) for the same resources. Discussions of cumulative impacts, irreversible and irretrievable commitment of resources, unavoidable adverse impacts, and the relationship between local short-term uses and long-term productivity conclude the chapter (Sections 4.16 through 4.19).

4.1.1 Impact Analysis Approach

Impacts associated with the alternatives are discussed in a section for each resource, resource use, or social and economic feature. Mitigation measures that are identified in the resource sections include reference to the project description mitigation measures as provided in Chapter 2 and the Best Management Practices (BMPs) from the *Final Programmatic EIS on Wind Energy Development of BLM Administered Lands in the Western States*, as described in Appendix B. Any additional mitigation measures not included as applicant-committed measures, including those outside the jurisdiction of Bureau of Land Management (BLM) or the Bureau of Reclamation (Reclamation) (such as Mohave County requirements) are described in individual resource sections, as applicable. The Project Area includes the locations proposed for the Wind Farm Site (turbine corridors, access roads, operations and maintenance (O&M) building, laydown areas, meteorological (met) towers, substations, switchyard, and collector lines), the primary access road from US 93 to the Wind Farm Site, the materials source (for construction), the temporary pipeline carrying water from existing wells to the temporary batch plant, and the distribution line (for powering construction activities and the O&M building). The disturbance area consists of all areas where the surface would be disturbed as a result of the Project including construction activities within the defined limits of disturbance such as concrete washout areas (refer to Section 2.5.2 and Table 2-7). From this description, an area of impact analysis was specified for each topic and impact duration definitions (short-term, long-term) were assessed where applicable.

As described in Section 2.5.2.8, selection of the 345-kV interconnection option would result in the need for Western Area Power Administration (Western) to replace the existing 345/230-kV transformer and associated breakers, switches, and other equipment at Mead Substation with two new 345/230-kV transformers and similar related equipment. All of this activity would be within the previously developed and disturbed substation area, which has been graded and surfaced with aggregate. Mead Substation is a heavily industrialized area with a large number of transmission lines entering and exiting the facility, and the new equipment would replace existing equipment within a large substation that already has numerous pieces of similar electrical equipment. Since the potential environmental impacts of the activities at Mead Substation would be negligible, they are not discussed further in this chapter.

The analysis methods in each section describe how the impact analysis was conducted and includes a description of the data used in the analysis. Where applicable, quantitative models, relevant scientific literature, and previously prepared environmental documents used in the analysis are identified. This section also presents the underlying assumptions that were used when analyzing impacts of the Project on a specific resource, resource use, or social and economic feature, including information gathered during the scoping. Following a discussion of analysis methods, each resource section presents impacts analysis of the alternatives. Impacts on resources and resource uses are analyzed and discussed in detail commensurate with resource issues and concerns identified throughout the process. Impacts are sometimes described using ranges of potential impacts or in qualitative terms. In the absence of quantitative data, impacts are described based on the professional judgment of the interdisciplinary team of technical specialists using the best available information. Text is provided to identify where the impact analysis is based on incomplete or unavailable information. Geographic information system (GIS) analyses and data from field investigations were used to quantify effects where possible. In each section, the potential environmental impacts from the implementation of Alternative A, B, C, and E are evaluated by comparing the current conditions described in Chapter 3 to the expected conditions resulting from each alternative.

Chapter 4 uses the terms “impacts” and “effects” interchangeably, and the terms “increase” and “decrease” are used for comparison purposes. For the purposes of the impact analyses, the impacts are described in terms of their expected duration, which refers to the permanence and longevity of the impacts. Duration of impacts is considered within the following time frames (where applicable to the resource):

- **Temporary impacts** occur during Project construction and/or decommissioning and persist for less than or equal to 2 years.
- **Short-term impacts** persist up to 5 years after construction is complete.
- **Long-term impacts** persist for more than 5 years after construction.
- **Permanent impacts** persist beyond Project decommissioning and continue for a reasonable period after Project reclamation.

4.1.2 Impact Analysis Assumptions Common to All Resources and Resource Uses

There are several assumptions used in the impact analysis that apply to all of the resources, resources uses, or social and economic features; these assumptions include:

- Application of design features would reduce impacts.
- Addition and reconstruction of Project roads may result in increased use of the area. Increased use of the area would result in additional indirect impacts on resources.
- Construction activity, including hauling within the Project Area, generally would occur only during daylight hours, although some operations (such as turbine assembly and concrete pouring) could occur at night when wind speeds are often lower and temperatures are cooler.
- Construction would occur over a period of approximately 12 to 18 months for any alternative.
- Blasting could occur anywhere ground disturbance is proposed, although the amount, location, and intensity of blasting are not known.
- Revegetation efforts would be successful. The success criteria for revegetation efforts would be defined in the Integrated Reclamation Plan that would be approved by BLM and Reclamation. The Integrated Reclamation Plan includes habitat restoration, native plant management, and noxious and invasive weed management. Construction would not be deemed complete until the regulatory agencies acknowledge that reclamation was complete under the approved success criteria.

- Revegetated areas would include the additional road width area and staging/laydown areas that would be needed for construction.
- Decommissioning would begin at the end of the right-of-way grant (approximately 30 years after commissioning the Project).
- Blasting would not be used during decommissioning unless required for demolition of foundations.

Additional assumptions specific to individual resources, resource uses, or social and economic features are listed in each section.

4.2 CLIMATE AND AIR QUALITY

4.2.1 Analysis Methods

This analysis evaluates estimated emissions of regulated air pollutants and greenhouse gases (GHG) from construction, operation, and decommissioning of the Project. Although air pollutant emissions are generated during the construction of wind energy facilities, operating wind facilities contribute relatively low levels of air pollution compared to fossil fuel fired power plants. Information presented includes:

- Short-term effects from fugitive dust (PM_{10}), criteria air pollutants (PM_{10}, nitrogen oxides [NO_x], carbon monoxide [CO], volatile organic compounds [VOCs], sulfur dioxide [SO_2]) and GHG emissions (reported in carbon dioxide [CO_2] equivalents, or "CO2*e*") from earth-moving activity, vehicles and equipment during construction of the wind farm, transmission lines, switchyards, substations, access roads and temporary cement batch plants, for each alternative.
- Fugitive dust, criteria air pollutant, and GHG emissions from vehicles and equipment due to operations and maintenance of the wind farm, including employee travel to and from work, and resulting from land use changes, from native desert to a developed facility.
- Sulfur hexafluoride (SF_6) emissions from new substations needed to interconnect with existing transmission lines in the Project Area. These emissions would occur over the operating life of the wind farm.

Quantitative air quality emissions were calculated using information contained in the Plan of Development (POD) (BP Wind Energy 2011a) such as the proposed construction schedule, acreage to be disturbed, specifications for proposed access roads, vehicle and equipment utilization, workforce planning, transportation needs, facility operating equipment and schedule, and BMPs to be implemented to reduce impacts. These data, along with published emission factors and equations, were used to develop the estimates. Sources are referenced in the footnotes of each emission table.

Wind power projects do not involve the combustion of fuels to generate electricity, so these projects have considerably lower operational impacts on air quality when compared to fossil fuel-fired generating facilities. The air quality impacts occurring during construction of the Project would be temporary and include tailpipe emissions from construction vehicles and equipment; earthmoving operations; sand and gravel mining at Detrital Wash; operation of a crushing, screening and wash plant (CSWP) to produce the clean sand, gravel, and crushed stone to make the concrete for the tower foundations; two portable concrete batch plants; power generators; and fugitive dust generated during the duration of construction.

The air quality impacts of temporary construction projects involving large land areas, similar to the proposed action, often do not need to be quantified in terms of predicted ambient concentrations of emitted air pollutants, because of the inherent complexities associated with transient emission sources; (construction activities and equipment move from site to site fairly quickly and readily). Accordingly, for purposes of providing the reader with an adequate perspective of the anticipated impacts, the quantified Project air pollutant emissions are compared to similar emission sources that are more familiar to a larger segment of the human population.

4.2.1.1 Identification of Issues

The following is a list of issues that were identified during Project scoping relating to climate, air quality, and climate change; these issues form the basis for the assessment of potential impacts:

- Potential impacts on air quality from fugitive dust from construction and increased traffic,
- Potential impacts from construction-related traffic emissions,
- Potential cumulative effects from emissions on regional air quality,
- Potential impacts from concrete dust, and
- Potential for climate change to influence the proposed Project, specifically within sensitive areas, and exacerbate projected impacts.

4.2.1.2 Protected Areas

Grand Canyon National Park is a Class I Area under the Clean Air Act (CAA) and air quality at the park is protected by the Prevention of Significant Deterioration (PSD) Program. Lake Mead National Recreation Area (NRA), a Class II Area, is also protected under the CAA although requirements are generally less stringent than for Class I areas. The Project Area is designated as Class II.

4.2.2 Alternative A

4.2.2.1 Construction Emissions

Construction of Alternative A would occur over a period of 12 to 18 months and result in a total area of ground disturbance of an estimated 1,537 acres. This alternative includes the installation of as many as 203 to 283 turbines depending on the turbine size chosen. During construction, particulate matter would be emitted, along with pollutants from combustion equipment, including NO_x, VOC, CO, SO_2, and GHG. Sources of dust or particulate matter emissions would include: site clearing and grading for all ground-disturbing activities, including but not limited to, planned locations for substations, the interconnect switchyard, O&M building, laydown yards, transmission line structures, and temporary and permanent (for the life of the Project) access roads; wind erosion from those areas where vegetation would be removed and from material storage piles; active earthmoving or groundbreaking activities such as digging, blasting, and ground contouring; activities associated with setting foundations for the substation structures, switchyard, O&M building, and transmission line structures; construction traffic on unpaved roads, and potentially tracked out soil material re-suspended by paved road traffic. Two temporary concrete batch plants and one CSWP would also be located on site. Combustion products would be emitted in the exhaust from internal combustion engines associated with the Project, including mobile construction equipment, stationary engines such as generators and construction support equipment, and vehicles transporting workers and delivering materials and equipment to and from the Project Area.

Table 4-1 summarizes the estimated criteria pollutant emissions for construction of Alternative A. The estimates use accepted emissions factors and are based on schedules, acreage values, and other pertinent information from the POD. Some of the emission factor sources used were the Midwest Research Institute's "Estimating Particulate Matter Emissions From Construction Operations," 1999; "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition," EPA/420-R-10-018, July, 2010; Chapter 5 of the "2002 Periodic Ozone Emission Inventory," Maricopa Association of Governments (MAG); and the ADEQ General Permit for Concrete Batch Plants.

Table 4-1 Estimated Construction Emissions (tons) for Alternative A

Type of Emissions	VOC	CO	NO_x	PM_{10}	SO_2
Earthmoving Activity (grading, trenching and excavation for foundations, roads, etc.)	-	-	-	522.3	-
Sand & Gravel Mining, CSWP Operations, and Delivery of Materials to Batch Plants	2.2	5.8	27.1	13.6	1.8
Operation of Concrete Batch Plants	2.4	6.5	30.1	15.6	2.0
On-site Vehicle and Equipment Tailpipe Emissions	24.0	165.3	139.8	404.4	19.6
Delivery of Major Project Components to Site	5.5	36.0	5.5	2.2	0.1
Local Construction Employee Commuting	3.7	49.3	3.7	0.3	0.3
Total Estimated Construction Emissions	**37.8**	**262.9**	**206.2**	**958.4**	**23.8**

As the data in the table demonstrate, earthmoving activity at the site (including excavation of tower foundations, construction of roads, trenching and grading) would contribute approximately 55 percent of the particulate emissions during construction. On-site construction vehicle and equipment tailpipe emissions would contribute approximately 42.2 percent of particulate emissions during construction, and the remainder would be attributable to sand and gravel mining at Detrital Wash, operation of crushing and screening equipment, operation of two concrete batch plants, delivery of major components to the Project Area, and construction employee commuting. Windblown dust could also increase since existing vegetation would be removed and/or disturbed during construction. On-site construction vehicle and equipment tailpipe emissions would be the primary source of gaseous air pollutants, including NO_x, CO, VOCs, and SO_2.

If the total PM_{10} emissions are divided by the number of acres that are anticipated to be disturbed for this alternative (958.4 tons/1,537 acres), the result is 0.61 tons per acre. As a comparison, the average annual wind erosion for cultivated cropland in Arizona from the 2007 Natural Resources Inventory was 14.7 tons/acre/year (range: ±6.7 tons/acre/year) (NRI 2009).

The construction schedule for the approximate 12 to 18 months (maximum) would consist of 10 hours per day, five days per week. Thus construction activity would occur during up to approximately 3,900 hours. Based on the maximum timeframe construction schedule and duration, average pound per hour (lb/hour) emission rates were calculated, as follows:

> Average hourly emissions (lb/hour) = (Total Project emissions (tons) * 2000 lb/ton) / 3,900 hours

The resultant average site-wide emission rates for each pollutant are as follows:

VOC:	19.38 lb/hour
CO:	134.82 lb/hour
NOx:	105.74 lb/hour
PM_{10}:	491.49 lb/hour
SO_2:	12.21 lb/hour

On any particular day, these estimated average site-wide emission rates would occur intermittently across several active construction areas within the proposed Project Area, thus emissions from any one such area would be a small fraction of these values. Emissions would typically be limited to daylight hours on active working days, although there could be some emissions at night when construction workers are taking advantage of low-wind conditions or cooler temperatures.

Fugitive dust tends to settle out within a few miles of its origin. The effect of this is most notable within a few yards of unpaved roadways, where dust caused by vehicle traffic settles onto vegetation and ground surfaces. Over time, the dust can accumulate to the extent that the coatings on plant surfaces are noticeable. These accumulations would be partially or completely removed by periodic rainfall and wind events. Specific measures to minimize the generation of dust caused by vehicle traffic on unpaved roads are included in Section 4.2.6, Mitigation Measures.

GHG emissions from internal combustion engines were also estimated, but on the basis of types of vehicles and equipment, fuel type (diesel vs. gasoline), total operating hours for each type, and average engine horsepower for each type, rather than the broad construction activity categories described above for estimation of criteria pollutants. The maximum total Project GHG emissions over the 18 month construction effort were estimated to be 1,113,088 tons of "CO_2 equivalent" (CO_2e). Table 4-2 lists the totals for the three GHGs included in this total, along with the global warming potential (GWP) values, as applicable.

Table 4-2 Breakdown of Estimated GHG Emissions for Alternative A

Carbon Dioxide (CO_2) (tons)	**Methane (CH_4) (tons)**			**Nitrous Oxide (N_2O) (tons)**			**Total Carbon Dioxide Equivalent (CO_2e) (tons)**
		GWP of 21	**CO_2e**		*GWP of 310*	**CO_2e**	
897,906.08	**10,291.58**		**216,123**	**61.48**		**19,059**	**1,133,088**

GWP = global warming potential

The U.S. Environmental Protection Agency's (USEPA's) Inventory of U.S. Greenhouse Gas Emissions and Sinks estimates a total of 6,633.2 million metric tons (MMT) of CO_2e was emitted from sources within the United States in 2009 (USEPA 2010(d)). (1 MMT is equivalent to 1.1 million U.S. tons.)

With regard to cement emissions, cement handling operations would occur at each of two concrete batch plants, located along the western and northern portions of the Wind Farm Site. The cement storage silos and the concrete mixing chambers in each batch plant would be equipped with baghouses to control approximately 99.5 percent of cement dust emissions during cement handling activities. Concrete batch plant operations are anticipated to occur 10 hours per day, five days per week, for a total of 39 weeks; (i.e., each batch plant would operate for 1,950 hours). Based on the foregoing, the maximum hourly and annual emissions of dry cement powder from cement transfer to the storage silos (deliveries to the batch plant) and from the storage silos to the weigh hopper (as concrete is being mixed) for the two batch plants combined were calculated, as follows:

Hourly cement emissions:	0.102 pounds
Daily cement emissions:	1.02 pounds
Total Project cement emissions:	426 pounds (0.213 tons)

Assuming each batch plant produces the same amount of concrete, the total estimated cement emissions from each during the Project would be 213 pounds, roughly equivalent to three 75-pound sacks. The emission outlets on the batch plant cement silo baghouses would be located approximately 20 to 25 feet above the ground. Over the course of 39 weeks, winds would be likely to occur from all directions, although several specific directions would likely dominate. Based on the foregoing, the cement emissions from the baghouses would likely be distributed, and settle to the ground, within a radius of a few miles from the location of each batch plant. Cement is strongly alkaline, but the caustic effects usually do not occur until the cement gets wet. The amount accumulated in any one area has not been quantified, but would be anticipated to be very small and have negligible effects on plants in the area.

Building the Project in two or more intervals could increase overall Project air emissions if the duration of construction activities increase. Increasing the duration of construction could also result in additional emissions from concrete batch plants, construction equipment and vehicles, if activities must be repeated and/or relocated. The potential increase in total project air pollutant emissions due to an extended duration of construction would be relatively minor.

4.2.2.2 Operational Emissions

Throughout operation of the wind farm, relatively small amounts of air pollutants would be emitted from mobile sources (primarily passenger vehicles) and stationary equipment at the facility. Wind farms require limited maintenance and include only small sources of combustion emissions, such as generators for emergency power and comfort heating/cooling equipment for support buildings. Periodically, it may be necessary to perform major overhauls and repairs, requiring the use of a crane and larger trucks. There would also be small quantities of VOCs emitted during routine changes of lubricating and cooling fluids and greases. The BLM Wind Energy Final Programmatic Environmental Impact Statement concludes that "the operation of a wind energy development project would not adversely impact air quality" (BLM 2005).

The electric power industry has worked with suppliers to examine leakage from transmission equipment and has implemented SF_6 emission reduction strategies to address concerns about the GWP of SF_6 and the potential impacts to the earth's climate. The USEPA investigated SF_6 leak rates from high voltage electric circuit breakers and found a range of 0.2% to 2.5% as a 50-year weighted average. In addition, the International Electrotechnical Commission (IEC) has set a standard for new equipment leakage of <0.5%. Since the new transmission equipment for the proposed Project would be required to meet this standard, emissions of SF_6 would be <0.5%.

4.2.2.3 Decommissioning Impacts

Decommissioning activities would result in air emissions similar to those caused by initial construction of the facility. The wind turbines, towers and support equipment would be removed. Since at least a portion of the turbine foundation would be removed, these areas would need to be restored and revegetated in a manner consistent with the surrounding desert land. After the vegetation is restored, particulate matter emissions from the site would be similar to that of the area prior to construction of the Project.

Equipment decommissioning would generate dust from travel on the area roads and from earthmoving during removal of foundations and from site restoration. Vehicle and heavy equipment emissions would occur during the operation of cranes, trucks, and earthmoving equipment. Similar to construction emissions, these impacts would be temporary. To minimize the levels of particulate in the air during decommissioning, dust suppression would be utilized along with other BMPs, such as reduced travel speeds.

4.2.2.4 Summary

Since Alternative A represents the largest Project footprint and the installation of the greatest number of wind turbines, impacts on air quality for the construction of this action would be greater than those from Alternatives B, C, and E. Temporary, localized impacts to visibility on or near the Project Area could occur if dust control BMPs (described in Section 4.2.6) are not implemented consistently.

4.2.3 Alternative B

Air pollutant emissions for Alternative B would be lower than for Alternative A because 153 to 208 turbines would be installed, or about 75 fewer turbines than with Alternative A. Temporary disturbance for Alternative B is estimated at 1,234 acres, or approximately 303 fewer acres of land disturbance than with Alternative A.

Emissions from the operating wind farm would be very similar to those for Alternative A because the turbines are not a substantial source of emissions. Emissions during decommissioning would be less than for Alternative A because fewer turbines would be removed and fewer acres of land would be disturbed.

Similar to Alternatives A, C, and E, a slight to moderate increase in construction emissions could occur if more than one construction interval is required to coincide with securing power purchase agreements.

4.2.4 Alternative C

The footprint of the Project Area for Alternative C is similar in size to the footprint for Alternative B. It is estimated that up to 1,264 acres would be temporarily disturbed during construction. The maximum planned number of turbines for Alternative C is 208, which is the same as Alternative B and 75 fewer than for Alternative A. Construction emissions for Alternative C would be nearly the same as for Alternative B and less than for Alternative A.

As described in Alternative B, operating emissions for the wind farm under this alternative would be very low. Emissions during decommissioning would be very similar to those for Alternative B and lower than those generated from decommissioning the larger number of turbines planned for Alternative A.

Similar to Alternatives A, B, and E, a slight to moderate increase in construction emissions could occur if more than one construction interval is required to coincide with securing power purchase agreements.

4.2.5 Alternative D – No Action

If the Project is not constructed, there would be no emissions related to construction, operations, or decommissioning activities. The acreage in the Project Area would not be disturbed.

Greenhouse Gases

A potential consequence of the No Action alternative is an increase in GHG and criteria pollutant emissions, assuming that the regional demand for electricity would result in the proposed capacity of 500 MW being met using a non-renewable technology. It is also possible that the demand would be met without increasing emissions through the development of another renewable energy project.

Wind energy is categorized as a renewable technology because the supply of wind does not diminish over time. Wind-generated electricity is produced without consuming fossil fuels. As a result, less air pollution, including GHG, is emitted per kilowatt of energy produced than the amount of air pollution emitted from electricity generated by burning fossil fuels. As a part of the International Atomic Energy Agency's (IAEA) program on Comparative Assessment of Energy Sources, an advisory group was tasked with developing a set of GHG emission factors for a variety of electricity generation technologies. The outcomes of this work were published in an IAEA bulletin titled, "Greenhouse Gas Emissions of Electricity Generation Chains, Assessing the Difference" (IAEA 2000). Figure 4-1 depicts the emission factors developed for renewable energy sources and newer generation (2005-2020) fossil fuel-fired sources. The emission factors are presented in units of grams of carbon-equivalent per kilowatt-hour of electricity generated (gC_{eq}/kWh). The term carbon equivalent means that emissions of methane (CH_4), nitrous oxide (NO), hydrofluorocarbons, perfluorocarbons, and SF_6 are weighted using each compound's global warming potential and added CO_2 emissions. For example, the grams of CH_4 emitted by a specific generation technology would be multiplied by methane's global warming potential of 21 to convert the emissions to a CO_2 equivalent value.

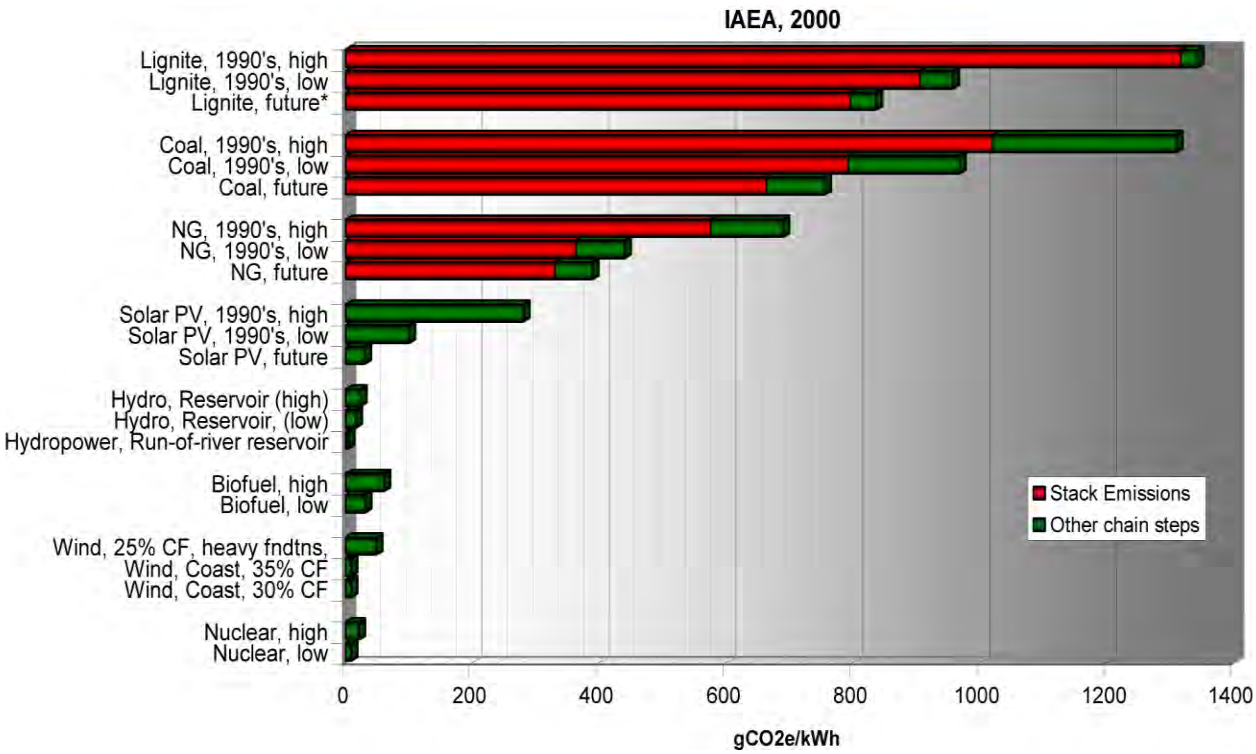


Figure 4-1 Range of Life Cycle Emissions for All Technologies

Although this work was conducted prior to 2000, the approach anticipated improvements to existing generating technologies and incorporated those more efficient systems in the 2005-20 technology categories. The emission factors include emissions directly associated with the power generating equipment and more indirect emissions resulting from acquiring the fuel source (if applicable), transporting materials, constructing the facility, decommissioning the facility, etc.

The IAEA report includes an analysis of factors that contribute to emission rates for specific generating technologies. For wind energy, the contributing factors include the energy needed to manufacture the turbine blades and install the turbine towers and foundations, construction regulations that vary depending upon the location of the facility, and the annual yield or capacity factor (CF) for the wind farm, which is primarily based on average sustained wind speeds in the area (IAEA 2000).

4.2.6 Alternative E – Agencies' Preferred Alternative

Air pollutant emissions attributable to construction for Alternative E would be lower than the construction air emissions predicted for Alternative A and higher than those predicted for Alternatives B and C. Alternative E would have about 83 acres more temporary ground disturbance than Alternative B, and 53 acres more than Alternative C. Compared with Alternative A, Alternative E would have about 219 acres less temporary ground disturbance, equating to a reduction of approximately 14 percent. Since ground disturbing activities generate particulate, criteria pollutant, and GHG emissions, reducing the number of acres disturbed results in decreased air pollutant emissions during construction of the Project.

Under Alternative E, similar to Alternative B, several of the turbine corridors in the northwest corner of the Wind Farm Site would be excluded from the Project Area. This would reduce the potential for temporary construction air emission impacts on Lake Mead NRA, particularly for visitors accessing the recreation area from the Temple Bar entrance station and for persons recreating on the NPS lands adjacent to the Wind Farm Site.

Phasing construction of turbines as the nameplate capacity is achieved could result in less ground disturbance and emissions from construction activities. This would potentially decrease air pollutant emissions for the Project relative to the Alternatives A, B and C. As discussed previously under Alternative A, earthmoving activity occurring during the installation of wind turbines contributes the majority of particulate matter emissions during Project construction. Accordingly, the installation of a decreased number of turbines would lower construction-related air emissions in relation to the extent of ground disturbance.

As discussed for Alternatives A, B and C, operating emissions for the wind farm would be very low. Emissions during decommissioning under Alternative E would be higher than those for Alternatives B and C, and lower than those generated from decommissioning the larger number of turbines planned for Alternative A.

4.2.7 Mitigation Measures

The proposed Project would implement BMPs in accordance with the POD (see Final EIS Appendix B) and the BLM Wind Energy Final Programmatic EIS. Examples of BMPs that would be required to minimize dust generated during construction include:

- Minimizing surface area disturbance, controlling erosion, applying dust suppression practices, and, where feasible, returning disturbed areas as close as possible to the original condition, including grade and vegetation.
- Using aggregate materials on access roads and internal Project roads and designing the roads using natural contours and avoiding excessive grades.
- Restricting travel within the Project Area to the roads developed for the Project and enforcing posted speed limits on those roads to minimize the generation of dust. The magnitude of the limits would be based on the localized soil stability conditions and would not exceed 25 miles per hour (mph).
- On-site wind speed monitors would be monitored during windy periods. Earthmoving activity would be minimized and vehicle speeds would be reduced if sustained winds exceed 22 mph, or if gusts exceed 30 mph.
- Reducing the wind profile of stockpiled materials and covering or watering materials that could become a source of fugitive dust.

- Utilizing dust abatement techniques, such as the application of water or appropriate palliatives (as pre-approved by BLM and/or Reclamation), prior to and during blasting activities, excavation, and surface clearing.
- Employing blasting techniques that minimize the ejection of material into the air.
- Placing cobble beds at egress points to minimize “trackout” onto paved roads.
- Complying with the parameters of the ground Transportation and Traffic Plan (Appendix C.2.8) with regard to projected road use, traffic volume minimization, and road maintenance.
- Requiring construction contractors to maintain equipment to meet federal and state requirements and conducting scheduled and unscheduled inspections to check for unnecessary idling and to confirm that equipment is in proper operation per the Health, Safety, Security and Environment (HSSE) plan and in adherence with manufacturer’s recommendations
- Employing trained environmental monitors, who would be on site daily to observe dust-prone areas to ensure implementation of emission control and other mitigation measures.

4.2.8 Unavoidable Adverse Impacts

No long-term unavoidable adverse impacts are anticipated with proper implementation of mitigation measures. There would be increased emission of particulate matter (dust) as well as vehicular emissions during construction of the facility.

4.3 GEOLOGY, SOILS, AND MINERALS

4.3.1 Analysis Methods

The geologic setting and geologic hazards assessment for the Mohave County Wind Farm Project was based on a review of data gathered from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), the Arizona Geological Survey (AZGS), the Arizona Department of Water Resources (ADWR), the U.S. Geologic Survey (USGS), and general professional knowledge of soils in Arizona. The analysis area for geology, soils, and minerals is defined in Section 3.3 as the Project Area.

4.3.2 Alternative A – Proposed Action

4.3.2.1 Construction

Geology

Surface and subsurface disruption could impact geological resources during preconstruction and construction activities (described in Sections 2.5.1 and 2.5.2, respectively) associated with Alternative A. Preconstruction activities that could cause long-term surface and subsurface disturbance include coring, trenching, blasting, clearing, and grading. Construction activities that could result in long-term geological impacts include construction of access roads, wind turbine pads, underground collection facilities, substations, transmission lines, met towers, switchyard, and O&M facilities. Construction activities could also result in bedrock disturbance. The type and magnitude of bedrock disturbance would be different for each construction item and would be contingent on the location of the individual item. Excavations for foundations and trenches for collector lines may encounter rock, and hard-rock excavation methods may be required. Hard-rock excavation methods could include ripping, hoe-ramming, and/or blasting. Construction activities could have temporary geological impacts on a maximum area of approximately 1,537 acres and long-term geological impacts on a maximum area of approximately 317 acres out of approximately 47,059 acres in the Project right-of-way (ROW). Building the Project in intervals to coincide with securing power purchase agreements would not affect the impacts to geology, as the extent of disturbance would remain the same as previously described.

Soil

Prior to and during construction of Alternative A, maximum temporary and long-term soil disturbance would be approximately 1,537 acres and 317 acres, respectively. The temporary impact of construction activities would include removal and disruption of surface soils over a broad area, including drilling activities, test pits, equipment and material staging areas, access roads, trenches for electrical/fiber optic systems, and the facility footprint. Construction areas, such as laydown/staging areas, would be cleared of topsoil and replaced with gravel (100 percent passing the #4 sieve) hauled from the Detrital Wash Materials Pit, which is the proposed Materials Source (subject to a sales contract with BLM). Areas of temporary disturbance would be restored as near as possible to prior conditions and in accordance with the Integrated Reclamation Plan that would accompany the complete POD. Excess soil would be used as fill material where needed in the Project Area to achieve desired road grades or for Project reclamation, such as recontouring to avoid potential soil erosion from stormwater runoff. Erosion from wind and water would be the major potential impact to the soil during construction. Construction of foundations, wind turbines, and other facilities could create erosion-related problems in areas where erosion is not currently present from the localized removal, loosening, and possible compaction of soils. Indirectly this could affect local topography, the amount of vegetative cover, and sediment transport from wind and during stormwater runoff. Soil removal would be kept to a minimum (see Section 2.5.1), although certain construction activities – including leveling, grading, and recontouring – would permanently relocate soil. These activities would utilize soil (likely from the foundation excavations) as fill and then be top-dressed with salvaged high-quality topsoils to aid in reclamation. In all cases, topsoil would be salvaged when possible and stockpiled for later use in reclamation. BMPs (Appendix B), Dust and Emissions Control Plans, a site-specific Stormwater Pollution Prevention Plan (SWPPP), and Mohave County requirements under the Grading Permit would be implemented and utilized to minimize the potential for water and wind erosion impacts.

Constructing the Project in two or more intervals would not require any additional ROW, access roads, or new permanent features outside of areas previously affected by the Project. Temporary effects on soils would be associated with the continued use of laydown/staging areas. Most effects from an additional construction interval would be temporary and similar to those described above for a single construction interval. As discussed in Section 4.5.2.1, reclamation would be initiated following the completion of each construction interval, and vegetation could be established prior to disturbance associated with a later construction interval. Indirectly this could reduce the potential for water and wind erosion impacts if reclamation success were improved from adaptive management. Long-term impacts in association with constructing in two or more intervals would not increase the total amount of disturbance and effects would be the same as described previously.

Long-term impacts on soils would be the localized removal of soils from the construction of turbine foundations. These steel-reinforced concrete foundations are expected to extend at least 10 feet below the existing ground surface. This could result in the long-term localized loss of soils from excavation and construction activities for turbine foundations.

Minerals

Although there are mineral deposits and mining operations near the Project Area, favorability for mineral mining is low and there are no known mineral or mining features within the Project ROW. Additionally, the BLM published a Notice of Segregation of Public Lands in Federal Register / Volume 77, No. 42 / Friday, March 2, 2012 / Notices / Pages 12874 and 12875 for the purpose of processing the ROW application (Section 2.5), and the land addressed in the wind farm application is segregated from appropriation for a period of 2 years starting March 2, 2012. Upon public notice with the Federal Register announcement, these public lands became segregated from appropriation under the public land laws, including the mining law, but not the mineral leasing or material sales acts. This segregation will not affect valid existing rights. The operation of the Materials Source on 320 acres located west of the proposed Project ROW would not be segregated and mining of this material could continue.

Reclamation of the Materials Source would continue as described in the Mining Plan of Operations. Disturbed areas would be recontoured to the extent feasible to meet conditions prior to disturbance and once mining operations have ceased, final reclamation would include reseeding with a BLM-approved seed mix.

Aside from the expected use of approximately 180,000 to 210,000 cubic yards of aggregate material for access roads and concrete from the Materials Source, future mineral resources are expected to be unchanged from the current conditions within the Project Area and nearby vicinity. This is due to the low favorability of the area for mineral mining.

Constructing the Project in two or more intervals to coincide with securing power purchase agreements would not affect the impacts to minerals extracted from the Materials Source, as the amount of cubic yards required would remain the same. New mineral claims filed within the Wind Farm Site would need to be consistent with the Project's ROW grants and authorized use should these be issued by BLM and Reclamation.

4.3.2.2 Operations and Maintenance

Geology

During O&M activities (as described in Section 2.5.4), there would be minimal to no impacts to the geology, as O&M activities primarily include work to be done to the wind turbines and generators.

Soil

O&M activities would have minimal impact to the soils within the Project Area. The expected impact is primarily related to maintenance of access roads and any erosion control activities that may be required during operation.

Minerals

It is unclear at this time whether BLM or Reclamation would allow mining between turbine corridors during Project operations; however, the low favorability of the area for mineral mining and the Project features on the landscape make future interest in exploration unlikely. Other impacts to minerals and mining are expected to be the same as those stated in Section 4.3.2.1.

4.3.2.3 Decommissioning

Geology

Decommissioning activities, which would include removal of wind turbines, met towers, electrical systems, structural foundations, and access roads are anticipated to have minimal impact to the geology at the time of decommissioning. These components would be removed from the site and replaced with native rock excavated during construction or purchased from nearby sources if surface rock is prevalent in the immediate area.

Soil

The decommissioning activities associated with the Project are anticipated to impact the soil within the Project Area. The removal of wind turbines, electrical systems, structural foundations, and access roads would have the potential to temporarily increase the risk of stormwater-related erosion and blowing dust as a result of disturbance or damage to vegetation and minor recontouring of disturbed areas. Though not expected to be severe, the consequences of stormwater-related erosion include the creation of new or deepening of old runoff channels, the transport of fertile soil to other areas, and the washing away of plants with shallow root systems. Decommissioning activities that would mitigate stormwater-related erosion and blowing dust concerns are regrading, recontouring, and revegetating the disturbed areas, and other BMPs that would be included in the site-specific SWPPP and Integrated Reclamation Plan. The entire depth of all shallow foundations and the top 36 inches of all deep foundations would be removed when decommissioning commences. The foundation portions below 36 inches are composed of non-leaching/natural elements that should not present a hazard to soils.

Minerals

Impacts to minerals and mining are expected to be the same as those stated in Section 4.3.2.1. Interest in future exploration for mineable minerals may be affected by the portions of turbine foundations left in place.

4.3.3 Alternative B

4.3.3.1 Construction

Geology

Construction activities included in Alternative B are expected to impact geology in manners similar to those described for Alternative A. The primary difference is in the quantity of disruption associated with the reduced area of the Project (approximately 34,720 acres) for this alternative. The maximum temporary and long-term areas of disruption are approximately 1,234 acres and 261 acres, respectively.

Soil

Construction activities included in Alternative B are expected to impact soil in a similar manner to those described for Alternative A. The main difference is in the quantity of disruption associated with the reduced area of the Project for this alternative. Alternative B is expected to result in 303 fewer acres of temporary disturbance and 56 fewer acres of long-term disturbance compared to Alternative A.

Minerals

Impacts to minerals and mining are expected to be the same as those stated in Section 4.3.2.1.

4.3.3.2 Operations and Maintenance

Impacts to geology, soil, and minerals are expected to be the same as those stated in Section 4.3.2.2.

4.3.3.3 Decommissioning

Impacts to geology, soil, and minerals are expected to be the same as those stated in Section 4.3.2.3.

4.3.4 Alternative C

4.3.4.1 Construction

Geology

Construction activities included in Alternative C are expected to impact geology in manners similar to those described for Alternatives A and B. The primary difference would be in the quantity of disruption associated with the area of the Project (approximately 35,302 acres) for this alternative. The maximum temporary and long-term areas of disruption would be approximately 1,264 acres and 269 acres, respectively.

Soil

Construction activities included in Alternative C are expected to impact soil in a similar manner to those described for Alternatives A and B. The amount of temporary disturbance would be 273 fewer acres and the long-term disturbance would be 48 fewer acres than Alternative A. Temporary and long-term disturbance would be about 30 acres and 7 acres respectively more than Alternative B.

Minerals

Impacts to minerals and mining are expected to be the same as those stated in Section 4.3.2.1.

4.3.4.2 Operations and Maintenance

Impacts to geology, soil, and minerals are expected to be the same as those stated in Section 4.3.2.2.

4.3.4.3 Decommissioning

Impacts to geology, soil, and minerals are expected to be the same as those stated in Section 4.3.2.3.

4.3.5 Alternative D – No Action

Alternative D has no construction, operations and maintenance, or decommissioning activities; therefore, there would be no impacts to the current geology, soil, or minerals in or near the Project Area.

4.3.6 Alternative E – Agencies' Preferred Alternative

4.3.6.1 Construction

Geology

Construction activities included in Alternative E are expected to impact geology in manners similar to those described for Alternatives A, B and C. The primary difference would be in the quantity of land involved in the Wind Farm Site (approximately 38,110 acres) and the amount of temporary and long-term ground disturbance for this alternative. The maximum temporary and long-term areas of ground disturbance would be approximately 1,317 acres and 268 acres, respectively. The temporary and long-term disturbance may be less if the nameplate generation capacity can be met with the construction of fewer turbines (see Section 2.6.6., Maps 2-11, 2-12 and 2-13). The reduction in temporary and long-term surface disturbance would be relative to fewer turbines being constructed.

Soil

Construction activities included in Alternative E are expected to impact soil in a similar manner to those described for Alternatives A, B and C. The amount of temporary disturbance would be 219 fewer acres and the long-term disturbance would be 49 fewer acres than Alternative A. Impacts on soils would be nearly the same as Alternatives B and C, with 7 more acres of temporary disturbance compared to

Alternative B and 1 less acre than Alternative C. Phasing construction as nameplate generation capacity is met could reduce surface disturbance relative to Alternatives A, B, and C if it resulted in fewer turbines constructed.

4.3.6.2 Operations and Maintenance

Impacts to geology, soil, and minerals are expected to be the same as those stated in Section 4.3.2.2.

4.3.6.3 Decommissioning

Impacts to geology, soil, and minerals are expected to be the same as those stated in Section 4.3.2.3.

4.3.7 Mitigation Measures

Erosion from wind and water, decreased soil productivity, and slope instability may develop as a result of construction. Implementing BMPs and a Dust and Emissions Control Plan, including applying water to the ground surface and instituting a 25 mph speed limit, would help to minimize erosion and prevent soil loss. To prevent localized landslides resulting from slope instability, disturbed areas would be recontoured with salvaged topsoil and soil removed during construction and later revegetated while rock slopes would be cut back to a stable grade and to the extent practicable, the locations of roads, turbines, and other structures would be chosen in an attempt to avoid placing them near unstable areas. Excavation at the Materials Source as described in the Mining Plan of Operations and the Detrital Wash Pit Mine Plan of Operations to reduce grades would minimize the amount of disturbance associated with obtaining borrow material and help maintain slope stability.

4.3.8 Unavoidable Adverse Impacts

Construction at the Project Area would likely result in several unavoidable adverse impacts. During construction, road grading and foundation excavation would have the highest short- and long-term impacts while the abandonment of turbine foundations would likely impact the site after decommissioning. Under all action alternatives, impacts on geological resources could result from surface and subsurface disturbing activities. Both surface and subsurface geology could be fractured or destroyed in areas where Project construction activities disturb bedrock such as coring, trenching, blasting, clearing, and grading. Blasting, coring, and trenching would locally fracture and permanently alter bedrock resulting in minor irreversible and irretrievable impacts on geology and surficial water flow. The type and extent of bedrock disturbance would be different for each of the Project features and site-specific conditions. Each action alternative would have the potential to impact geology on all, or portions of, areas associated with the construction of different Project features.

Though unlikely, access to mineral resources discovered within the Project footprint could be restricted until decommissioning. The ability to mine any future discoveries could be hampered by the presence of turbines and related power transmission lines. Future possible mining activities would be precluded for two years by the segregation notice published in the March 2, 2012 Federal Register, and preceded by and subject to the operation of the Project.

4.4 WATER RESOURCES

This section describes the potential effects on water quality, water supplies, and the physical characteristics of water features. Information on existing water resource conditions from Section 3.4 of this EIS was used as a baseline to identify and quantify potential impacts associated with each alternative. The analysis area for water resources is defined in Section 3.4 as the three regional watersheds; the Lower

Detrital Wash, Middle Detrital Wash, and Trail Rapids Wash-Lower Colorado River (see Map 3-5, Water Resources).

Water resource issues relevant to the Project were identified through the agency and public scoping process. These issues include the potential for sedimentation and increases in salinity in tributaries to the Colorado River; modification to the hydrologic system by decreasing infiltration and increasing storm water runoff; consumptive water use during Project construction and operation; potential impacts to wells, wetlands and floodplains; and potential for water quality impacts due to accidental spills of fuels or hazardous substances.

4.4.1 Analysis Methods

The water resources assessment for the Project was based on a review of data gathered from the POD (BP Wind Energy 2011a), Mining Plan of Operations (Barr 2011), Preliminary Jurisdictional Delineation Report (EcoPlan 2011), and regulatory agencies including ADWR, Arizona Department of Environmental Quality (ADEQ), and the U.S. Army Corps of Engineers (USACE). The POD provided information on the Project design and configuration that was used to evaluate the location and magnitude of potential impacts on water resource. The Mining Plan of Operations provided information on anticipated mining activities at the Materials Source. Specific information from the Mining Plan that was incorporated into the analysis included production water quantities for concrete mixing and dust control, as well as reclamation procedures that would be implemented by BP Wind Energy after mining was completed. As the potential impacts on water resources, including quality and quantity, are not often directly measurable, the impact analyses have been based on indicators that can be measured. For example, storm water runoff may vary in quantity or quality during Project construction, but such a change is not quantifiable at this time; however, the acres of surface disturbance serves as a way to measure the changes in water quality in downgradient washes. Table 4-3 lists the indicators and approach to address these types of potential impacts on water resources.

Table 4-3 Approach to Evaluation of Water Resources

Type of Impact	Indicator	How Is This Measured?
Physical impacts on surface water features	Physical changes to an existing surface water feature, including but not limited to streams that meet the definition of a Water of the U.S. ("jurisdictional waters" that include ephemeral washes)	Acres of surface disturbance with the potential to affect jurisdictional and non-jurisdictional waters
Changes in quality or quantity of storm water flow	Changes to water quality in downgradient washes due to sediment transport	Acres of surface disturbance
Impact on flooding potential	Changes to projected frequency, extent, and duration of flooding	Increased impervious surfaces in the Project Area, presence of facilities within a floodplain, and proximity of surface disturbance to water features
Impact on surface water or groundwater quality	Potential for spills and leaks that might impact water quality	Presence of equipment, fuels, or hazardous materials on site, and proximity of these materials to wells or surface water features
Impact on groundwater supply	Decreased groundwater in storage beneath the site	Amount of groundwater required for construction and operation relative to total groundwater currently in storage and existing groundwater demands

In order to compare effects associated with the alternatives, these indicators were considered both independently and in conjunction with one another. BMPs or mitigation measures that would reduce potential impacts are described in Section 4.4.6.

Temporary disturbance areas refer to those areas impacted only during construction activities, such as lay-down areas for construction supplies. Long-term disturbance areas refer to areas with aboveground structures or that would otherwise be impacted consistently during operation of the Project. A key assumption in this analysis is that temporary water requirements for construction would be met using three existing off-site water wells at the Materials Source, and that longer-term water requirements throughout operation of the Project would be met via a water well developed near the O&M building with a pumping capacity comparable to a residential use well.

4.4.2 Alternative A – Proposed Action

4.4.2.1 Construction (Surface Water Impacts)

Construction of Alternative A would cause temporary and potentially permanent impacts on the physical nature of the unnamed washes running through the site due to constructing access roads, grading, and placement of foundations for turbines. Depending upon the type of turbine selected during final Project design, it is possible that up to 17.26 acres of jurisdictional waters could be affected by construction of the Project (see Table 4-4). These permanent impacts are based on the preliminary jurisdictional delineation within the Project Area (detailed maps are provided in the jurisdictional delineation prepared by EcoPlan 2011) and preliminary designs for the location of the facilities. However, when the final technology and turbine locations are identified, it is expected that the actual disturbance of jurisdictional waters would be less because BP Wind Energy would avoid to the extent possible jurisdictional waters when siting access roads, utilities, construction laydown areas and the operation and maintenance building (EcoPlan 2011). If BLM and Reclamation approve the ROW grant, BP Wind Energy in consultation with USACE will obtain one or more permits in compliance with the Clean Water Act. The permits may include a Nationwide Permit (NWP) for utility lines (including the construction or modification of transmission lines, associated access and spur roads, and substations), a NWP 14 for linear transportation projects including Project access roads, and/or an Individual Permit under the Clean Water Act.

Table 4-4 Potential Impacts to Jurisdictional Waters of the United States by Turbine Type (in acres) Alternative A

	77- to 82.5-meter Rotor Diameter Turbine	90- to 101-meter Rotor Diameter Turbine	112- to 118-meter Rotor Diameter Turbine
Turbines	1.34	1.21	0.78
Construction Laydown	0.92	0.92	0.92
Operation and Maintenance Building	0.17	0.17	0.17
Utilities[1]	0.22	0.22	0.22
Access Roads[2]	14.61	14.59	14.59
Total	17.26	17.11	16.68

Notes: [1] Utilities includes the temporary pipeline and the transmission line (gen-tie)
[2] Access Roads include potential impacts from improvements to existing roads and new roads required to construct, operate and maintain the proposed facility.

Residual impacts on jurisdictional waters would be mitigated through the implementation of BMPs and mitigation measures as described in Section 4.4.6. Prior to any construction activities, the USACE would conduct a review of potential impacts on jurisdictional waters and the USACE may require additional mitigation measures for this Project in accordance with the Clean Water Act.

Construction activities that disturb the surface, such as clearing, grading, trenching, and excavation to build turbine foundations, could increase the potential for sediment erosion and transport by removing stabilizing vegetation and increasing runoff during storm events. Alternative A would have the largest surface disturbance footprint of the alternatives; as described in Table 2-7, about 1,537 acres would be temporarily disturbed during construction. The majority of this disturbance would occur within the Lower Detrital Wash watershed. Water quality in Detrital Wash and its tributaries may be degraded by the addition of suspended sediments or dissolved constituents in storm water. Water quality impacts are often associated with sediment eroded from road surfaces, road cuts, and fill-slopes into the drainage network. The sediment can include both coarse- and fine-grained material that affects channel substrates, surface water turbidity, and dissolved solids concentrations. Sediment eroded into ephemeral tributaries of Detrital Wash would be flushed downstream during storm events and flash flooding, and could indirectly increase the influx of sediment into Lake Mead.

Temporary construction facilities, such as laydown/staging areas or concrete batch plants, would remain a source of eroded sediment until the disturbance area has been successfully reclaimed. Successful reclamation may require several growing seasons given the arid climate of the Project Area. This could prolong water quality impacts from increased sediment deposition in ephemeral washes. However, impacts would be mitigated by retaining cut vegetation and spreading it as mulch during reclamation to promote seed growth and help control erosion, and other erosion control measures as would be designated in the site-specific SWPPP.

Indirect surface water impacts could also occur from physical disturbance during construction, operation, and maintenance next to ephemeral washes that carry occasional, storm-related surface water. The delivery of sediment to washes would be expedited near roadways or where an insufficient buffer exists between cross-drainage outlets and the wash channels. Roadside ditches and road surfaces provide a direct conduit to streams for the transport of sediment and other pollutants that may be attached to or washed from the road surface by runoff. Locations where roads and water or drainage features intersect, or are in close proximity to one another, create areas of potential concern. The possibility for these types of impacts may be limited by low precipitation levels in the area, but may be greater in areas with more pronounced slopes. Mitigation of construction activities near named washes, such as Trail Rapids Wash, would be particularly important to ensure activities upstream (in the Project Area) do not indirectly affect water quality downstream. These impacts would be mitigated through the implementation of BMPs and measures listed in Section 4.4.6, including sedimentation and erosion control measures. These standards are mandated by the Arizona Administrative Code (A.A.C.) Title 18, Chapter 11, and enforced by ADEQ.

Floodplain impacts are not anticipated from the wind turbines under Alternative A because no turbines or associated facilities would be constructed within 1 mile of a mapped 100-year floodplain. However, materials for Project construction that are sourced from the existing Materials Source would impact the floodplain of Detrital Wash in Section 23, Township 28 North, and Range 21 West. Much of the southern portion of Section 23 has been previously mined; it is anticipated that new mining activity would expand the mine to the north. Floodplain impacts would occur as sand and gravel is excavated from the banks and channel of Detrital Wash. The excavations would temporarily decrease the floodplain capacity of the wash by widening and deepening the stream channel. To process aggregate, BP Wind Energy would utilize the existing processing area, which is outside the limits of any wash or stream (Barr 2011). No permanent aboveground structures would be constructed in the Detrital Wash floodplain.

Following Project construction, areas of the Materials Source that have been affected by the Project would be reclaimed in accordance with the negotiated or competitive sale permit from BLM to extract materials from the quarry, which could include removing mining and processing equipment, re-contouring the processing and parking areas, replacing overburden over the flatter portions of the site, and reseeding with the required seed mix. These reclamation practices would help avoid long-term floodplain impacts by returning the stream bed and banks of Detrital Wash back to their existing baseline condition.

Potential spills and leaks during construction and operation could occur due to the use of vehicles and motorized equipment. A site-specific SWPPP and a Spill Prevention, Control, and Countermeasures (SPCC) Plan would be prepared for the Project in compliance with applicable regulations. Successful implementation of these plans would help prevent surface water quality impacts from accidental spills of fuels and other chemicals.

Building the Project in intervals could increase the duration of construction activities but would not increase ground disturbance as the Project would not require any additional ROW, access roads, or new permanent features outs. Temporary effects on surface water from construction conducted in intervals would be primarily associated with sediment in local areas near roadways or where an insufficient buffer exists between cross-drainage outlets and the wash channels. The sediment could occur in areas where there is continued use of roads during construction. As discussed in Section 4.5.2.1, reclamation would be initiated following the completion of each interval, and this could reduce the potential for water and wind erosion impacts if adaptive management improved reclamation success. Long-term impacts in association with construction conducted in intervals would not increase the total amount of disturbance and effect would be the same as described previously.

4.4.2.2 Operations and Maintenance (Surface Water Impacts)

After construction and associated mitigation is complete, about 317 acres of long-term ground disturbance would remain under Alternative A. Operations and maintenance activities could increase sediment production by eroding surficial sediments that are easily transported by runoff and surface water flow. Increased sediment production could indirectly affect water quality in downstream ephemeral washes. Routine road maintenance would include grading and filling of ruts as necessary to maintain road usability. However, road maintenance could also temporarily increase erosion rates by renewing the supply of loose sediment on the road surface.

4.4.2.3 Decommissioning (Surface Water Impacts)

The potential impacts from decommissioning the Project would be similar to those during construction, but the effects on surface water could be less if turbine foundations remain in place. Ground disturbed to remove aboveground structures, turbine foundations, and other Project facilities could contribute to sediment erosion and sedimentation until reclamation effects have stabilized the disturbed areas.

4.4.2.4 Construction (Groundwater Impacts)

Water requirements for Project construction would be met using groundwater from three off-site wells at the Materials Source located along the access road from US 93, or a new well proposed at the O&M building. The wells that are currently located on BLM-administered land near the Materials Source are permitted for industrial withdrawals. Groundwater from these wells would support operation of the mine, provide batching water for concrete production, and be used for dust suppression. One of the wells, registration number 531378, has a permitted pumping rate of 60 gallons per minute. This well alone should be sufficient to meet most of BP Wind Energy's daily water needs during construction. Any water demands that surpass what well 531378 supplies would be met using the other permitted industrial water supply wells at the Materials Source.

As described in BP Wind Energy's Mining Plan of Operations (Barr 2011), approximately 25,000 gallons of water per day would be needed for mixing concrete at peak production. The batch plant would also require up to 1,500 gallons per hour to support operations such as truck washing and hydrating aggregate prior to mixing. These additional uses could consume between 3,000 and 15,000 gallons of water per day (assuming a maximum 10 hour work day); thus, it is expected that average daily water use at the batch plant would range from 28,000 to 40,000 gallons. The concrete batch plant would be operated five days a week for approximately 25 weeks, depending on the period of wind turbine foundation and facilities construction (Barr 2011). Total water use requirements for the batch plant are presented in Table 4-5 based on the 40,000 gallon daily water use estimate. As shown in the table, cumulative water use to support the batch plant may be as much as 5.0 million gallons (15.3 acre-feet) over the life of the plant.

Table 4-5 Estimated Water Use during Project Construction

Activity	Water Use			Total	
	Daily Requirement (gal)	Weekly Requirement (gal)	Duration (weeks)	gal	acre-ft
Mixing concrete	25,000	125,000	25	3,125,000	9.6
Truck washing, hydrating aggregate	15,000	75,000	25	1,875,000	5.8
Subtotal	**40,000**	**200,000**	**---**	**5,000,000**	**15.3**
Dust Suppression	100,000	500,000	39	19,500,000	59.8
Grand Total	**140,000**	**700,000**	**---**	**24,500,000**	**75.2**

NOTES: gal = gallons, ft = feet
Calculation assumes a 10-hour work day and 5-day work week.
The sum of individual quantities may not match reported totals exactly due to rounding.

The groundwater wells at the Materials Source would also supply water for dust suppression during Project construction at an estimated rate of 100,000 gallons per day, five days a week, for 39 weeks (Barr 2011). This equates to a total usage of 19.5 million gallons of water, or 59.8 acre-feet (Table 4-5). Combined water use for the batch plant and dust suppression would therefore reach approximately 75.2 acre-feet during construction.

While water would be used to suppress dust in most cases, palliatives pre-approved by BLM and/or Reclamation may potentially be used in high-traffic areas. Palliatives that have the potential to effect water quality, such as magnesium chloride, would not be used.

Currently, the Detrital Valley Basin-Fill aquifer is in a steady state condition, with the amount of recharge that occurs in mountain front areas approximately equal to the amount of groundwater discharging to Lake Mead. Both recharge and discharge fluxes have been estimated at 1,400 acre-feet per year (Garner and Truini 2011). The one-time construction water use for this Project of 75.2 acre-feet could be supplied by either capturing natural recharge, capturing natural discharge, or by removing groundwater from storage. However, groundwater storage appears to be the most likely source to meet construction water demands because the Project water supply wells are located in the central valley area (Township 28 North, Range 21 West), several miles from the mountain fronts where recharge occurs, and at least 17 miles from the springs and discharge areas along Lake Mead (see Map 3-5).

As described in Section 3.4.3.5, the Basin-Fill aquifer contains an estimated 239,000 to 637,000 acre-feet of potentially recoverable groundwater in the township and range where the existing Project water supply wells are located. If it is conservatively assumed that groundwater storage in this township is closer to the low end of this range, total pumping withdrawals for dust control and concrete production represent approximately 0.03 percent of recoverable groundwater. This percentage of depletion is unlikely to affect the overall groundwater supply, and would be replenished over time by natural groundwater recharge. The annual aquifer recharge rate (1,400 acre-feet per year) is 18 times higher than estimated construction water use, suggesting that the aquifer would be replenished quickly, and would remain in a near-steady state condition during Project construction. Other groundwater uses would not be impacted by the Project because there are few groundwater demands in Detrital Valley. According to two recent studies, current pumping in the Detrital Valley Basin is comparable to historic pumping, with municipal use averaging less than 300 acre-feet per year in the entire valley during the years 2001-2005 and 2007-2008 (ADWR 2009; Garner and Truini 2011). There are currently no recorded industrial or agricultural water demands in the basin.

Groundwater quality beneath the site could be impacted by spills and leaks during construction due to the use of vehicles and motorized equipment. The SPCC Plan developed for the Project would help mitigate groundwater impacts from accidental spills. In the event that a spill went undetected, potential groundwater quality impacts could also be avoided due to the relatively deep water table. A map presented by Anning et al. (2007) shows water levels for several wells near the Project Area in Township 28 North, Range 19-21 West. In 2006, the shallowest depth to water recorded at this subset of wells was 160 feet below ground surface. Thus, if any chemicals are spilled and remain undetected for some period of time, they are unlikely to infiltrate the full distance to groundwater without encountering clay or another fine-grained layer that would impede further vertical migration. Spilled chemicals would also disperse, degrade, and/or volatilize to some extent along the long migration pathway. The treatment of spills, including chemicals, is discussed in detail in Section 4.13.

4.4.2.5 Operations and Maintenance (Groundwater Impacts)

Potable water would also be needed throughout the life of the Project to support drinking water and sanitation needs for employees at the O&M building. It is anticipated that a well would be installed near the O&M building that would be comparable to a well for residential use. Groundwater would be pumped from this well at an estimated rate of 100 gallons per day or 36,500 gallons (0.1 acre-feet) per year.

4.4.2.6 Decommissioning (Groundwater Impacts)

Water usage for decommissioning would be similar to the amount of water used for dust suppression during construction (Table 4-5). An appropriate source of water would be identified in coordination with BLM and Reclamation during planning for the decommissioning process because available sources may change by the time the Project is decommissioned.

4.4.2.7 Project Options

The options for transmission line interconnection locations could influence water resource impacts if ground disturbance results in changes to sediment transport that affect water quality. The primary distinction between the transmission line options is the amount of temporary and long-term ground disturbance. Connection to the 500-kV Mead-Phoenix line would require approximately 18 acres of construction-related disturbance for the switchyard. This temporary disturbance area is approximately 7 acres more than the anticipated temporary disturbance needed for switchyard interconnection to the 345-kV Liberty-Mead line (11 acres). The larger area of the Mead-Phoenix line switchyard could result in a greater potential for indirect water quality impacts from increased sediment loads in ephemeral washes during construction. These impacts would be temporary and would subside once the switchyard was constructed and any land not needed for operation of the facility was successfully reclaimed. After reclamation and mitigation, the Mead-Phoenix and Liberty Mead options would result in 10 and 8 acres of long-term surface disturbance, respectively. Surface disturbance-related impacts (as described above under *Surface Water Impacts*) resulting from the construction of the on-site transmission line to connect the switchyard to the mainline would be the same regardless of the transmission option selected.

With Alternative A, it is anticipated that a portion of the collector lines would be installed overhead on support structures versus burying all the collector lines in trenches; however, both options would be feasible. Any reduction in the amount of trenching would slightly reduce the overall indirect water quality-related impacts.

4.4.3 Alternative B

4.4.3.1 Construction (Surface Water Impacts)

Compared to Alternative A, Alternative B would eliminate two wind turbine corridors on the north end, one corridor on the south end, and four corridors along the northwestern part of the Wind Farm Site. In addition, eight corridors on the eastern side of the Project Area would be shortened to minimize the proximity of turbines to private property that may potentially be developed for residential use. About 1,234 acres of temporary, construction-related ground disturbance would be anticipated, of which 261 acres would be expected to be long-term ground disturbance under Alternative B. This reduction in the Wind Farm Site footprint compared to Alternative A (1,537 acres of temporary disturbance, of which 317 acres would be long-term ground disturbance) would decrease direct construction-related impacts to ephemeral washes. Locally, the smaller temporary disturbance area under Alternative B would reduce the amount of erosion and excess runoff caused by the Project, helping to limit surface water quality impacts from eroded sediment.

Surface water impacts from roads crossing wash or drainage channels would decrease compared to Alternative A since fewer miles of access roads would be constructed with the lower number of wind turbine corridors. Depending upon the type of turbine selected during final Project design, it is possible that up to 15.50 acres of jurisdictional waters could be affected by construction of the Project (see Table 4-6).

Table 4-6 Potential Impacts to Jurisdictional Waters of the United States by Turbine Type (in acres) Alternative B

	77- to 82.5-meter Rotor Diameter Turbine	90- to 101-meter Rotor Diameter Turbine	112- to 118-meter Rotor Diameter Turbine
Turbines	1.23	1.11	0.64
Construction Laydown	0.92	0.92	0.92
Operation and Maintenance Building	0.17	0.17	0.17
Utilities[1]	0.22	0.22	0.22
Access Roads[2]	12.96	12.96	12.97
Total	15.50	15.38	14.92

Notes: [1] Utilities includes the temporary pipeline and the transmission line (gen-tie)
[2] Access Roads include potential impacts from improvements to existing roads and new roads required to construct, operate and maintain the proposed facility.

The potential to impact jurisdictional waters would be similar to Alternative A, although the smaller development area associated with Alternative B would avoid jurisdictional waters in areas where turbines would not be constructed. In addition, potential water quality impacts from accidental spills would be reduced or eliminated where the Project Area footprint has been scaled back.

4.4.3.2 Operations and Maintenance (Surface Water Impacts)

Surface water impacts from operations and maintenance of the wind farm facility would be similar to Alternative A. However, the long-term disturbance area would be roughly 17 percent less than for Alternative A so there would be fewer Project features influencing surface water drainage patterns with Alternative B.

4.4.3.3 Decommissioning (Surface Water Impacts)

The smaller Wind Farm Site associated with Alternative B would result in fewer turbines and access roads to remove and reclaim when the Project is decommissioned. Therefore, temporary disturbance and short-term, indirect effects on water quality from storm-water runoff would be less than with Alternative A. However, following reclamation, the long-term effects of decommissioning would be comparable to Alternative A.

4.4.3.4 Construction (Groundwater Impacts)

Under Alternative B, impacts on groundwater would be reduced compared to Alternative A. Less groundwater would need to be pumped for the concrete batch plant because approximately 25 percent fewer wind turbine foundations would be constructed (153 to 208 turbines for Alternative B vs. 203 to 283 turbines for Alternative A). With fewer access roads needed, groundwater requirements for dust suppression also would be reduced. If it is assumed that water usage requirements during Project construction would be approximately 25 percent less than Alternative A due to the reduction in wind turbines and access road lengths, total water usage under Alternative B would be around 56.4 acre-feet. This value represents approximately 0.02 percent of the total groundwater available in storage in the township and range where the planned water supply wells are located.

Although Alternative B would have a smaller footprint, the potential for accidental spills to contaminate groundwater would be similar to the other Project alternatives. Measures to prevent and respond to spills would be implemented for all Project alternatives. The relatively deep water table beneath the site also suggests that, in the event that a spill remains undetected for some period of time, the spill would have a low probability of impacting groundwater quality.

4.4.3.5 Operations and Maintenance (Groundwater Impacts)

Groundwater needs for operations and maintenance would be the same as for Alternative A.

4.4.3.6 Decommissioning (Groundwater Impacts)

Water needed for dust suppression during decommissioning would be expected to be about 25 percent less than with Alternative A because the Project would be smaller and have fewer features to remove. The water source would be determined in coordination with BLM and Reclamation during decommissioning of the Project.

4.4.3.7 Project Options

Impacts from the Project options would be the same as Alternative A.

4.4.4 Alternative C

4.4.4.1 Surface Water Impacts

There are few practical differences in water resource impacts between Alternatives C and B. The total number of planned wind turbines (up to 208) would be the same, and the overall Project footprint would also be similar. The main difference between the two alternatives is the distribution of development.

However, direct and indirect construction-related impacts to ephemeral channels would still be similar to Alternative B. Depending upon the type of turbine selected during final Project design; it is possible that up to 15.75 acres of jurisdictional waters could be affected by construction of the Project (see Table 4-7).

Table 4-7 Potential Impacts to Jurisdictional Waters of the United States by Turbine Type (in acres) Alternative C

	77- to 82.5-meter Rotor Diameter Turbine	90- to 101-meter Rotor Diameter Turbine	112- to 118-meter Rotor Diameter Turbine
Turbines	1.20	1.10	0.64
Construction Laydown	0.92	0.92	0.92
Operation and Maintenance Building	0.17	0.17	0.17
Utilities[1]	0.22	0.22	0.22
Access Roads[2]	13.24	13.24	13.24
Total	15.75	15.65	15.19

Notes: [1] Utilities includes the temporary pipeline and the transmission line (gen-tie)
[2] Access Roads include potential impacts from improvements to existing roads and new roads required to construct, operate and maintain the proposed facility.

Aside from differences in the distribution of development, other surface water effects related to construction, operation, and maintenance of the Project would be the same as Alternative B.

4.4.4.2 Groundwater Impacts

Groundwater impacts from construction, operation, and maintenance of the Project are expected to be the same as Alternative B.

Project Options

Impacts from the Project options would be the same as Alternative A.

4.4.5 Alternative D – No Action

Hydrology, water quality, and water supplies would be not be impacted by Project construction, operation, or decommissioning activities under the No Action Alternative. The primary actions and features that are currently affecting water quality and hydrology within the area are wash crossings, motorized vehicle use, livestock use, wildfire, roads, and other surface disturbing activities. Existing hydrologic processes including erosion and sedimentation would continue to occur from these actions and features. As described in Chapter 3, the natural condition of the site is erosive and natural erosion would continue under this alternative and the action alternatives. However there is no data estimating the amount of natural erosion.

4.4.6 Alternative E – Agencies' Preferred Alternative

4.4.6.1 Construction (Surface Water Impacts)

There are few practical differences in water resource impacts between Alternative E and Alternatives A, B, and C. The total number of planned wind turbines and the overall Project footprint would be similar, particularly among Alternatives B, C and E. The main difference between the alternatives is the distribution of development. However, direct and indirect construction-related impacts to ephemeral channels would still be similar among all alternatives. Depending upon the type of turbine selected during final Project design, it is possible that up to 16.10 acres of jurisdictional waters could be affected by construction of the Project under Alternative E, assuming all phases of Alternative E are needed to meet nameplate generation capacity (see Table 4-8).

Table 4-8 Potential Impacts to Jurisdictional Waters of the United States by Turbine Type (in acres) Alternative E

	77- to 82.5-meter Rotor Diameter Turbine	90- to 101-meter Rotor Diameter Turbine	112- to 118-meter Rotor Diameter Turbine
Turbines	1.32	1.18	0.78
Construction Laydown	0.92	0.92	0.92
Operation and Maintenance Building	0.17	0.17	0.17
Utilities[1]	0.20	0.20	0.20
Access Roads[2]	13.49	13.48	13.48
Total	16.10	15.95	15.55

Notes: [1] Utilities includes the temporary pipeline and the transmission line (gen-tie)
[2] Access Roads include potential impacts from improvements to existing roads and new roads required to construct, operate and maintain the proposed facility.

4.4.6.2 Operations and Maintenance (Surface Water Impacts)

Surface water impacts from operations and maintenance of the wind farm facility would be similar to Alternative A. However, the long-term disturbance area would be roughly 15 percent less than for Alternative A so there would be fewer Project features influencing surface water drainage patterns under Alternative E. Surface water impacts and long-term disturbance would be similar to Alternatives B and C.

4.4.6.3 Decommissioning

Temporary disturbance and short-term, indirect effects on water quality from storm-water runoff would be less than with Alternative A and similar to Alternatives B and C. However, following reclamation, the long-term effects of decommissioning would be comparable to all alternatives.

4.4.6.4 Groundwater Impacts

Groundwater impacts from construction, operation, and maintenance of the Project are expected to be the same among all of the action alternatives.

4.4.7 Mitigation Measures

The objective of mitigation measures is to maintain the quality of waters presently in compliance with Federal and state water quality standards. Implementing and complying with the following required measures that are based on regulations would reduce impacts on water resources.

- Develop and implement a SPCC Plan that outlines procedures to prevent the release of hazardous substances into the environment, thereby avoiding water resource contamination. The SPCC Plan would include containment measures that would be implemented in areas where chemicals, fuel, and oil are stored. Spill response kits containing items such as absorbent pads would be located on equipment and in the on-site temporary storage facilities to respond to accidental spills.
- Prepare and implement a site-specific SWPPP to control sediment (expected to be the primary nonpoint source contaminant), and to manage the collection, conveyance, and/or storage of storm water runoff at the Project Area.

- During operations, inspect site access roads monthly and after heavy rainfall events to identify and repair eroded areas or blocked culverts. This would help prevent degradation of road conditions that could contribute to stream sediment loading if left uncorrected.
- Obtain and comply with necessary permits in accordance with the Clean Water Act Section 404 (dredge and fill) and Section 401 (water quality) from the USACE.
- Avoid locating Project features in jurisdictional waters, ephemeral washes, and aquatic features, as feasible, and/or minimize impacts through techniques such as bridging, using at-grade crossing for roads, providing adequate buffers for flood control, and minimizing the number of road crossings over waters.
- Avoid, to the extent possible, the short- and long-term adverse impacts associated with the occupancy and modification of floodplains.
- Comply with all Federal and state laws related to control and abatement of water pollution. All waste material and sewage from construction activities or Project-related features would be disposed of according to Federal and state pollution-control regulations including the Clean Water Act, Arizona Surface Water Quality Standards (AAC Section R18-11-107) and Aquifer Water Quality Standards.
- Control erosion per the Integrated Reclamation Plan that would accompany the complete POD.

4.4.8 Unavoidable Adverse Impacts

The mitigation measures described in Section 4.4.6 would help prevent and/or lessen many of the potential surface water and groundwater impacts associated with the Project. However, some potentially adverse effects would be unavoidable, particularly modifications to the natural surface drainage network and removal of groundwater from storage. The drainage network may be modified by grading the site to divert storm-water flow away from ephemeral washes, or by re-routing drainage channels through culverts at road crossings. These modifications could alter peak flow dynamics and change the way sediment is transported through the surface water system, ultimately affecting water quality.

Groundwater pumping for Project construction activities would remove up to about 75 acre-feet from storage in the Basin-Fill aquifer of the Detrital Valley. These withdrawals would be irretrievable since they would either be used for consumptive purposes, such as mixing concrete, or would be applied for dust control and lost to evapotranspiration. Projected withdrawals represent a very small portion (0.03 percent) of potentially recoverable groundwater in the township where the pumping wells are located. The pumping withdrawals would be replenished over time by natural recharge that occurs in mountain-front areas. As such, the consequences of this impact on the Detrital Valley Basin-Fill aquifer would be nearly imperceptible.

4.5 BIOLOGICAL RESOURCES

This section describes the potential effects on biological resources within the Project Area, including local resident species and species that may temporarily use the Project Area during migration or during some seasons of the year. Information on existing biological resources from Section 3.5 of this EIS was used as a baseline to identify and quantify potential impacts associated with each alternative. The analysis area for biological resources is defined as the Project Area, with the exception of raptors which is the Project Area plus a 10-mile radius around the Project Area.

4.5.1 Methods

Assumptions

The impact assessments for biological resources considers that activities involved in Project construction, as described in Chapter 2, would involve heavy construction equipment, traffic, excavation, trenching, noise, airborne particulate matter, detonation of explosives (blasting), and vibration. Operation or maintenance activities would involve short-term site visits by employees in the turbine area, possible repair of the turbines with cranes, and regular work at the O&M building. The operational duration of the Project would be about 30 years. Decommissioning of the Project would involve construction equipment, traffic, noise and vibration, re-grading, and demolition activities. This analysis also assumes the following description of wind power project functions:

- Wind speeds are variable across the landscape.
- Each turbine moves independently of the others, according to the wind speed and direction at its location.
- An observer would normally see that some turbines are turning and others are not turning at any given time.
- Rarely would all the turbines be generating at full capacity or turning at the same rate. Thus, it is difficult to predict at what time, speed, duration of, and how long any one turbine would be turning.

Assessment

The impact assessment was based on baseline field surveys for biological resources that were conducted between 2007 and 2011, published literature, and electronic records review through the USGS National Gap Analysis Program (Southwest ReGAP), AGFD, and USFWS. The biological resource surveys provided presence/absence data for general plant and wildlife species and quantified use estimates and relative abundance data to estimate the impacts for species with known concerns relative to wind energy facilities. These detailed surveys included surveys for bats, migratory birds, nesting raptors, and golden eagles. Electronic agency records from AGFD and USFWS provided non-specific locality data, though allowed for a qualitative estimate of the potential impacts on sensitive resources or special status species. Acres of vegetation removal were derived from the acreages of disturbance found in Table 2-7. Facility features were then mapped and combined with Southwest ReGAP data, which were used to estimate acreages of vegetation and land cover types disturbed in the Project Area. Based on these aggregated data, analyses were conducted based on proportions and the likelihood of disturbance from siting the turbines to estimate the proportional impacts on resources within the turbine corridors; however, where possible, direct impacts on resources have been analyzed where Project features and resource data are available.

The Project Area and nearby lands include areas that have been modified by human activity (residential development, recreational pursuits, road development, etc.), noise, and invasive plant species. Some impacts from the Project cannot be discriminated from the background disturbance, particularly when these involve behavioral responses of wildlife. In some situations different species or individuals within a species may be more sensitive or less sensitive depending on the type of stimulus. Despite this problem, impacts are discussed in the context of the literature specific to the type of impact similar to the type of Project-related disturbance.

Other assumptions of the analysis include that reclamation would meet BLM and Reclamation success criteria for restoration of plant communities, as defined in the Integrated Reclamation Plan. Construction would not be complete until the regulatory agencies acknowledge that restoration was complete under the approved success criteria. Also weed control measures would be effective at controlling the spread of noxious weeds or invasive plants so that any establishment of these remains local and short-term.

Indicators of Project impacts on biological resources that were considered in the analysis include:

- Decline in the quality or quantity of habitat for wildlife or plants
- Reduction of a plant or an animal population below a level needed to sustain itself
- Establishment or expansion of noxious weeds or introduced plants
- Reduction of a special status species, bat, raptor, or migratory bird population
- Obstruction of the movement of any resident or migratory wildlife species
- Change to the return interval and severity of wildland fire (fire regime or condition class)
- Disruption of normal animal behavior due to noise or other human activity

The magnitude of impacts was based on the following criteria:

- **Minor:** The effect on an indicator is detectable but not readily apparent or strong enough to change an indicator substantially.
- **Moderate:** The effect on an indicator is apparent. Project activities could change the indicator over a small area or to a lesser degree.
- **Major:** The effect on an indicator is large and highly noticeable. Project activities that result in major effects would change the indicator over a large area or to a large degree.

The types of impacts were categorized as direct or indirect, defined as:

- **Direct** impacts occur at the time and place of a disturbance or Project activity.
- **Indirect** impacts are those that occur later in time or space from a Project activity.

In many situations a Project activity may have direct impacts in the short-term but indirect impacts that persist in the long-term. With wildlife, Project-related noise from vehicles may initiate a direct behavioral change in the short-term but chronic noise from wind turbines may lead to indirect impacts that persist in the long-term, such as lost breeding opportunities, smaller populations, or fewer species in the vicinity of wind turbines. In some circumstances there is no clear-cut point at which short-term or direct impacts would become long-term or indirect ones. To the extent possible, the duration and type of impact are described in the impacts analysis.

4.5.2 Alternative A – Proposed Action

4.5.2.1 Vegetation and Land Cover Types

Construction

Installation of turbine facilities would result in removal of approximately 561 acres of vegetation, with the greatest direct loss of vegetation occurring in Sonoran-Mojave creosotebush-white bursage desert scrub (creosotebush desert scrub) (Table 4-9). However, this is the most abundant vegetation community in the Project Area. Post-construction reclamation would include revegetation of most of the disturbed land surrounding the turbines, which would result in long-term loss of approximately 17 acres of vegetation altogether (Table 4-9). After reclamation of disturbed areas, long-term recovery to pre-disturbance plant cover and biomass conditions would take decades (Abella 2010). Mohave Desert plant communities can take 50 to 300 years for natural recovery due to unpredictable precipitation in this environment (Lovich and Bainbridge 1999), but reclamation improves the possibility of success and shortens the recovery period (Abella et al. 2007). For comparison, vegetation disturbances left to recover naturally are still apparent in creosote desert scrub used for World War II training near Yuma, Arizona (Kade and Warren 2002).

The other components of the Project would have the short-term direct impact of removing an additional 976 acres (a total of 1,537 acres for the Project) after construction and would predominantly impact creosotebush desert scrub (Table 4-9). The long-term disturbance from these other components would reduce the total amount of disturbance to a total of 317 acres for the Project after post-construction revegetation. The recovery period to pre-disturbance plant cover and biomass would be long-term. The types of disturbed vegetation associated with new access roads and the met towers cannot be determined because final siting is not complete (Table 4-9). However, these could be sited all or mostly in creosotebush desert scrub.

Table 4-9 Potential Vegetation Impacts from Project Features, Alternative A

Project Feature	Affected Vegetation or Land Cover Type	Short-term Disturbance (Acres)	Long-Term Disturbance (Acres)
Wind Turbines	Inter-Mountain Basins Big Sagebrush Shrubland	0	0
	Inter-Mountain Basins Semi-Desert Shrub Steppe	2	
	North American Warm Desert Bedrock Cliff and Outcrop	0	0
	North American Warm Desert Volcanic Rockland	4	<1
	Mojave Mid-Elevation Mixed Desert Scrub	26	1
	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	528	16
	Turbine Totals	***561***	***17***
Two Temporary Laydown/Staging Areas	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	32	0
Two Substations	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	10	10
Transmission Line to Switchyard Interconnecting to Mead-Phoenix 500-kV line or Interconnecting to Liberty-Mead 345-kV line	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	35	<1
Road along transmission line (20 foot width)	Sonora-Mojave Creosotebush-White Bursage Desert Scrub	15	15
Switchyard for an interconnection to Liberty-Mead 345-kV line	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	11	8
Switchyard for an interconnection to Mead-Phoenix 500-kV line	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	18	10
Operations and Maintenance Building and associated facilities such as parking	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	5	5
Improvements to Existing Roads, including collector line trenches and any utility or communication lines to the O&M building	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	47	0
	Sonora-Mojave Mixed Salt Desert Scrub	<1	0
Development of New Access Roads, including collector line, utility lines, communication lines, and crane paths	Undetermined	758	253

Project Feature	Affected Vegetation or Land Cover Type	Short-term Disturbance (Acres)	Long-Term Disturbance (Acres)
Temporary Met Towers (assumes 20 total, including potential pre-construction power curve testing temporary met towers, if required)	Undetermined	37	0
Permanent Met Towers (assumes up to 4 for the life of the Project)	Undetermined	6	<1
	Total Disturbance (with 500-kV switchyard) [1]	**1,537**	**317**

SOURCES: USGS National Gap Analysis Program (Southwest ReGAP) 2004, BP Wind Energy 2011a (Acreages from Southwest ReGAP were not field verified)
[1] Totals may vary due to rounding

Fugitive dust generated during construction would deposit on plants adjacent to turbine sites and Project roads and could affect photosynthesis, respiration, transpiration, and reproduction (Farmer, 1993; Trombulak & Frissell, 2000). This could result in minor long-term changes to plant composition next to these areas. Dust suppression practices and reducing travel speed to 25 mph would lessen the impact, but watering to reduce fugitive dust could increase the likelihood of establishing or spreading noxious weeds and invasive plants along Project roads.

Soil compaction from heavy equipment and removal of topsoil for Project facilities, roads, and turbines would alter soil structure and function (Prose et al. 1987, Lei 2007). In the long-term, this could have the indirect impact of altering the ability of disturbed sites to support the original baseline vegetation after reclamation.

The option to have collector lines run partly underground and partly above ground could provide flexibility in avoiding ground disturbances in some areas with sensitive plant resources and habitats. In those areas where these sensitive vegetation resources occur, the above-ground collector lines could span the sensitive resource area, where feasible, without disturbing it. The fully buried collector line option may create greater ground disturbance in areas where multiple trenches are needed to meet engineering and safety requirements.

The short-term use of a small proportion of the groundwater in the area for construction (mixing concrete, dust control, etc.) would not result in any changes to vegetation.

The total direct short-term impact to vegetation would include 1,537 acres where plants would be cleared for construction, which is about 3 percent of the vegetation within the Project Area of Alternative A. Revegetation would restore all but about 317 acres in the long-term to reduce the direct impact. The recovery period to pre-disturbance plant cover and biomass would be long-term. Overall, the acres of vegetation removed would result in a moderate impact to vegetation that would reduce in the long-term as reclaimed vegetation develops. Indirect impacts on vegetation resources from proliferation of invasive plants and noxious weeds could occur in the disturbed areas; these impacts are described in Subsection 4.5.2.2.

Depending upon the power purchase agreements, the Project could require additional construction in the future. Constructing the Project in intervals would not require any additional ROW, access roads, or new permanent features outside of areas previously affected by the Project. Temporary effects on vegetation and landcover would be associated with the continued use of laydown/staging areas. Most effects from constructing the Project in intervals would be temporary and similar to those described above. Constructing the Project in intervals could reduce the extent of disturbance to vegetation and landcover at one time as reclamation is implemented as soon as practicable after construction activities have ended. In addition, constructing the Project in intervals could allow the opportunity to use adaptive management and improve subsequent reclamation techniques.

Operations and Maintenance

Impacts associated with the operations and maintenance of Alternative A are not expected to result in any additional direct disturbance to vegetation and land cover types. About 317 acres of land disturbed during construction would continue to be in use and unavailable to support vegetation through Project operations, while the remaining 1,220 acres of vegetation would be undergoing recovery after reclamation treatment. These disturbances from construction would remain apparent throughout the operational life of the Project. Travel along Project roads for facility maintenance would periodically generate small amounts of fugitive dust, which would be minor compared to dust associated with construction and would not likely affect adjacent plant community composition.

Decommissioning

Decommissioning of Alternative A would result in some redisturbance (vegetation removal, compaction of soil, fugitive dust) where turbines, facilities, utility and collector lines are removed and land that had been reclaimed and revegetated is disturbed in the process of removing the Project facilities.

Some decommissioning options could create more or less disturbance than others. Buried collector lines that are dug up and removed would create a larger disturbance than if these could be cut and pulled-out with minimal ground disturbance. Leaving collector lines in place would result in no additional ground disturbance and no additional disturbance to vegetation. Partial removal of the top portion of turbine foundations would create less surface disturbance to vegetation than complete removal. Removal of the O&M yard, substations, and switchyard would disturb the footprints of these areas but would allow the sites to be reclaimed and revegetated. Specific techniques for the removal of facilities would be planned to incorporate technologies available at the time of decommissioning and would be coordinated with the BLM, Reclamation, and Western. Following demolition and reclamation, the sites should resemble the original vegetation community at an early stage of ecological succession. The recovery of vegetation to pre-disturbance conditions after reclamation would remain as a long-term impact, in which plant composition and cover could deviate from baseline conditions for decades (Lovich and Bainbridge 1999). The reintroduced disturbance from decommissioning would be minor, because it is assumed that the impacted acres would be smaller than those impacted during construction.

4.5.2.2 Noxious Weeds

Construction

Moving construction equipment onto the Project Area without it being washed and inspected would have the indirect impact of increasing the risk of introduction of noxious weeds and invasive plant species into the area. Development of the various Project features would disturb approximately 1,537acres in the short-term, with long-term disturbance reduced to about 317 acres after post-construction revegetation that would be guided by provisions of the Integrated Reclamation Plan that will accompany the complete POD. Disturbed ground would be prone to infestation by noxious weeds and invasive plant species that can degrade native vegetation communities (Brooks and Pyke 2001). Known problem species in the Project Area include Sahara mustard (*Brassica tournefortii*), which could proliferate in disturbed sandy areas, and red brome (*Bromus rubens*), cheat grass (*Bromus tectorum*), Mediterranean grass (*Schismus barbatus*), Malta star thistle (*Centaurea melitenis*), Russian thistle (*Salsola tragus*), and red-stem filaree (*Erodium cicutarium*), which have broad habitat adaptations and could proliferate throughout much of the disturbed area. The indirect impact of an increase of these species would lead to further indirect, long-term impacts that would degrade habitat for wildlife and increase the frequency and intensity of wildland fire in the Project Area.

Vehicle traffic into the Project Area could introduce seed or propagules of noxious weeds or invasive plant species. The construction period would have the greatest amount of truck travel, with an average of 150 one-way trips per day and a peak of 250 one-way trips per day from off-site locations into the Project Area. Personal vehicle travel could bring in these plant materials from a wide range of areas, depositing seeds or plant parts from the access point at US 93 to the laydown yard. Trucks delivering materials to the Project Area from a range of localities could travel along the internal routes and could introduce noxious weeds or invasive plant species throughout much of the Project Area. With successful mitigation to limit the introduction and spread of noxious weeds or invasive plant species during construction and post-construction reclamation in the short-term, the impacts would be moderate and localized.

While the potential for spreading noxious weeds and invasive plant species would still exists if the Project were constructed in two or more intervals to coincide with securing power purchase agreements, the exposure area would be smaller within a given period of time. Disturbing a smaller area could reduce the potential for noxious weeds and invasive species to establish if reclamation success improves due to adaptive management.

Operations and Maintenance

The potential for the indirect impact of introducing and spreading noxious weeds would persist at a lower level in the long-term during Project operations. Most travel into the area would occur between US 93 and the O&M building/yard. Trips would involve personal vehicles traveling to the work site and trucks delivering materials and removing solid wastes from the site. Plant materials introduced through these routes could spread farther into the Project Area by vehicles traveling along Project routes for maintenance activities. Maintaining standards to manage noxious weeds and invasive plant species throughout the life of the Project would help to limit the potential spread of these plants in the Project Area to maintain the impacts at a moderate level.

Decommissioning

The possibility of introducing and spreading noxious weeds and introduced plant species during the decommissioning period would be similar to that of the construction period. Personal vehicles and haul trucks would be the possible conveyances of plant material into the Project Area. The removal of turbines and the other support infrastructure would create additional areas of ground disturbance that would be vulnerable to infestation with invasive plants or noxious weed species. The additional impacts from re-disturbance and the potential to introduce or spread invasive plants or noxious weeds would be moderate with applied mitigation measures. Mitigation measures will be defined in an Integrated Reclamation Plan to help to limit or prevent weed infestations during decommissioning of the Project.

4.5.2.3 Wildland Fire

Construction

Development of the Project would have the direct and indirect impact of altering the potential for wildland fires in the area. In the short-term, land clearing would have the direct impact of temporarily removing the fuel source on approximately 1,537 acres where vegetation is cleared for construction. In the long-term, as shrub-scrub vegetation returns after reclamation, the current fire regime (Regime IV: 35-100+ year frequency stand replacement severity) would return. The time to recovery to post-disturbance plant composition and cover would require several decades, but re-vegetation would decrease the time and improve the likelihood of success (Abella et al. 2007). Weed management practices that are followed to conform to the Integrated Reclamation Plan would control the spread of noxious weeds and invasive plant species (an indirect impact) in the Project Area by maintaining discontinuous fuels, which would aid in retaining the current condition class (Class 2: fire regimes on these lands have been moderately altered from their historical range by either increased or decreased fire frequency; Section 3.5), and fire regime (Regime IV) outside of disturbed areas. Building the project in construction intervals based on secured power purchase agreements would have similar effects on the fire regime; however, disturbing a smaller area within a given time period could reduce the potential for noxious weeds and invasive species to establish if reclamation success improves due to adaptive management. This is not likely to alter the recovery time after disturbance and would have similar effects on the current condition class.

Increased human activity in the Project Area could have the direct impact of introducing a higher likelihood for ignitions that could increase the frequency of fire and could contribute toward altering the current fire regime (Regime IV). A potential source of ignition could come from running vehicles that park over dry vegetation, in which the catalytic converter contacts and starts an ignition. Another possible source would come from people who intentionally or unintentionally start fires in the area (e.g., smoking, welding sparks, or flames from torches). The risk of impact would change with the amount of traffic and activity. Traffic and human activity and the potential for human sourced ignitions would rise considerably in the short-term during construction. If the Project were built in two or more construction intervals, it could increase length of time there is human activity and the potential for ignitions due to the greater duration of construction activities. However, as the number of vehicles, project facilities, and the construction workforce would not increase, the risk of ignitions would be the same.

During construction activities changes to wildland fire would primarily occur in areas disturbed by development and construction of the wind facility, which is only about 3 percent of the total Project Area. Due to the small percentage of the affected area, but with the potential for invasive plant species and noxious weeds and wildland fire to affect areas outside the disturbance footprint, the overall impacts during construction would be moderate.

Operations and Maintenance

Wildland fire management would not change with implementation of the Project. Suppression would remain the preferred method of management. The need for suppression would increase as a direct impact because of the addition of built structures in the Project Area, but new access roads in the Project Area could aid in suppression efforts of wildland fires that could ignite in the region. The direct impact of human sourced ignitions would decrease during operations and maintenance because the volume of human traffic in the area would be substantially less than during construction. Continuing to follow weed prevention measures during operations and maintenance would help to retain discontinuous fuels in the Project Area, which would help to retain the fire regime (Regime IV) and condition class (Class 2) in the long-term.

During operations and maintenance, impacts to wildland fire could affect areas outside the disturbance footprint. Impact levels largely hinge on controlling the establishment and spread of noxious weeds and invasive plant species. The known invasive plant species in the region are difficult to control and are major agents of intensifying wildland fires. With successful mitigation to limit the introduction and spread of noxious weeds or invasive plant species during construction and post-construction reclamation in the short-term, the long-term impacts would be moderate and localized during Project operations.

Decommissioning

The additional impacts from re-disturbance during decommissioning would alter the potential for wildland fire by disrupting fuel sources and increasing the potential to introduce or spread invasive plants or noxious weeds. Revegetation or recovery of disturbed areas in the long-term would re-establish desert shrubland that has fuel types resembling the pre-disturbance condition. Long-term reclamation would be required for re-establishment of vegetation that resembles baseline cover and plant composition. Following the same measures as applied during construction to limit ignition sources from vehicles or people would aid in retaining the current fire regime in the Project Area by maintaining the fire return frequency (35 to 100+ years). Continuing to follow weed prevention measures during decommissioning would help to retain discontinuous fuels in the Project Area, which would help to retain the fire regime (Regime IV) and condition class (Class 2) throughout the Project Area in the long-term. Impacts would remain moderate but depend on the ability to prevent or control noxious weeds and invasive plant species in the long-term.

4.5.2.4 Wildlife

Although the body of knowledge on the effects of wind farms on bats and big game is growing, the effects on most mammals are poorly understood (Arnett et al. 2007). Potential impacts to wildlife resources under the Alternative A include the direct loss of habitat, indirect habitat loss due to behavioral avoidance and alterations of movement patterns, degradation of surface water habitats, and mortalities resulting from construction activities, wildlife-vehicle collisions and human interactions. The severity of these effects on wildlife species depend upon factors such as the sensitivity of the species, seasonal use patterns, type and timing of project activity and physical parameters (e.g., topography, cover, forage, climate).

If the Project were constructed in intervals based on secured power purchase agreements, the area avoided by wildlife due to increased human activity would be smaller for the individual construction period. However, because the entire Project would be eventually constructed, there would still be a period when wildlife would be expected to avoid all Project development areas when construction work increases human activity in a given area. The magnitude of the potential impacts on most wildlife species would be dependent upon the density and location of infrastructure. While construction intervals would not change the density and location of infrastructure, it could result in construction vehicle use of the access roads over a longer period of time. Construction intervals could result in less ground disturbance at any given time, potentially improving reclamation success. Indirectly, this could reduce the temporal loss of wildlife habitat.

Small Mammals

Construction

The main direct impact to terrestrial small mammals would occur from the long-term loss and fragmentation of habitat, which includes 1,537 acres where vegetation would be cleared for construction of Project facilities, turbines, and access roads. In the long-term reclamation would reestablish vegetation and habitats that are similar to the existing conditions on all but about 317 acres that would be needed for Project facilities and operations. An indirect long-term impact from the development of the Project infrastructure could lead to reduced population densities of small mammals in the vicinity of infrastructure ranging from a few meters for small rodents and generally scaling in distance with body-size for larger species (Benítez-López 2010). Those species inhabiting creosote scrub in the Project Area would be affected the most, due to the Project primarily impacting this vegetation type (more than 1,424 acres). Project roads and turbines could impact approximately 67 acres of volcanic rocklands, bedrock cliff and outcrops, and uplands habitats as well. Table 4-10 lists small mammal species potentially impacted in these habitats. With about 3 percent of the available habitat being degraded or lost to construction, the total impact would be minor to moderate.

Other impacts on small mammals could occur from the Project during construction. Individual mammals (primarily rodents, rabbits, and hares) could be injured or killed on a localized basis, a direct impact, when land is cleared for turbines, transmission lines, collector lines, switchyard, substations, laydown yard, and O&M facility or when vehicles travel in the Project Area. Weed infestations that could occur after land is disturbed could have the indirect impact of degrading existing habitats and food resources for the small mammal species enumerated above. Some individual mammals could be trapped in trenches dug for buried collector lines, but mitigation measures to prevent entrapment would minimize or eliminate entrapment.

Impacts from vehicle collisions and entrapment would be minor because few if any individuals would be harmed by these activities. Land clearing and weed infestations would have moderate impacts; loss of individuals (clearing) or degradation of habitat (weeds), would not be extensive throughout the Project Area, affecting about 3 percent of the available habitat.

Table 4-10 Small Mammal Species Affected by Project Development According to Habitat Type

Creosotebush Desert Scrub Species	
Desert shrew (*Notiosorex crawfordi*)	Desert pocket mouse (*Chaetodipus penicillatus*)
Desert cottontail (*Sylvilagus audubonii*)	Western harvest mouse (*Reithrodontomys megalotis*)
Black-tailed jackrabbit (*Lepus californicus*)	Cactus mouse (*Peromyscus eremicus*)
Harris' antelope ground squirrel (*Ammospermophilus harrisii*)	Southern grasshopper mouse (*Onychomys torridus*)
Round-tailed ground squirrel (*Spermophilus tereticaudus*)	Desert woodrat (*Neotoma devia*)
Botta's pocket gopher (*Thomomys bottae*)	Kit fox (*Vulpes macrotis*)
Arizona pocket mouse (*Perognathus ampulus*)	American badger (*Taxidea taxus*)
Rocky Outcrops or Mountainous Species	
Rock squirrel (*Spermophilus variegatus*)	Canyon mouse (*Peromyscus crinitus*)
Rock pocket mouse (*Chaetodipus intermedius*)	Ringtail (*Bassariscus astutus*)
Western white-throated wood rat (*Neotoma albigula*)	Cliff chipmunk (*Neotamias dorsalis*)

SOURCE: Hoffmeister 1986

Impacts on small mammals would be the same if the Project were constructed in intervals to coincide with secured power purchase agreements. Two or more construction intervals could increase the duration of construction activities, extending the duration of construction-related noise, traffic and human activity, but reducing the extent of ground disturbance during a given time period. Indirectly, if the reclamation success was improved from adaptive management, this could minimize the effects on the population of some small mammals in localized areas.

Operations and Maintenance

Although not fully understood, the effects of chronic noise, an indirect impact from the operation of the turbines could mask communication, impede detection of predators, and increase vigilance behavior in small mammals (Barber et al. 2009). Some species may adapt to the ambient noise from the turbines, but, overall, the added noise in the environment could exacerbate the effects to habitat disturbance and human presence in the Project Area (Barber et al. 2009), which could add to the indirect impact of displacement of individuals in and near turbine corridors (Arnett et al. 2007). Species-specific impacts for the small mammal species that inhabit the Project Area are not available; impacts would be minor to moderate depending on the number of species that could be impacted and the total area of noise impacts.

Vehicles traveling within the Project Area could collide with small mammals (primarily rodents), during operations and maintenance. The likelihood of collision would be minor because fewer trips into the Project Area would be required compared to construction.

Reclamation and revegation of disturbed areas would result in recovery of disturbed small mammal habitat in the long-term. During this period, small mammal diversity could increase in the reclaimed sites, with no apparent difference to undisturbed areas (Patten 1997) in the Project Area.

Decommissioning

The impacts on mammals during the decommissioning period would be similar to that of the construction period. Ground disturbance caused by removal of turbines and the other support infrastructure would create areas of degraded habitat that would be of marginal value until these areas recover or become vegetated after reclamation. Revegetation may take several decades (a long-term habitat impact) for structure and composition to resemble baseline conditions, due to the small amount of precipitation and slow growth rates of desert scrub. However, recovery of the mammal community could occur sooner than the plant community (Patten 1997).

Bats

Construction

Direct impacts on bats would occur during the construction process. Potential loss of foraging habitat (areas where bats hunt for insects or other prey) would include 1,537 acres where vegetation would be cleared for construction. Species inhabiting or potentially inhabiting the Project Area, such as the pallid bat, big brown bat, and canyon bat, have broad foraging habits (Western Bat Working Group [WBWG] 2005), could forage over the entire Project Area, and would experience loss of available foraging habitat across all disturbance areas, which is about 3 percent of the available habitat in the Project Area. The California myotis and Townsend's big eared bat, would likely concentrate their foraging along vegetated washes (WBWG 2005), which would experience little loss of available acreage (primarily where access roads cross washes). The greater western mastiff bat and Mexican free-tailed bat mostly forage at higher altitudes and longer distances (WBWG 2005) and would likely be unaffected by loss of vegetation in the Project Area. The big free-tailed bat may employ this same foraging strategy based on similar flight and wing-shape characteristics as the two other molossid bats. Although Allen's big-eared bat roosts near the Project Area, the species likely forages at higher elevations in surrounding mountains (WBWG 2005) and not in the Project Area, and thus this bat species would not be affected by vegetation removal in the Project Area. The Yuma myotis, western small-footed myotis, and fringed myotis are likely seasonal residents that would forage in association with ephemeral water courses. These species likely would be unaffected by vegetation removal due to the limited available habitat in the Project Area. The hoary bat, western red bat, and silver-haired bat are likely uncommon or rare seasonal migrants that move through the Project Area (WBWG 2005) and are not reliant on the vegetation, which lacks a forest or woodland structure. To the extent that any bat species use the Project Area for foraging, reclamation would restore foraging habitats on all but about 317 acres that would experience long-term disturbance, but recovery to baseline conditions would take several decades.

Mine roost sites that were identified outside the Project boundary would not be impacted by the Project, but crevice roost sites in mountainous terrain in the vicinity (largely in the vicinity of Squaw Peak) could be disturbed if blasting for turbine foundations occurs near a roost site. Of the possible species that utilize the study area, the hoary bat, western red bat, and silver-haired bat are the only bat species that do not roost in rock crevices (WBWG 2005). The remaining species utilize rock crevices for roosting to different degrees. The canyon bat, western mastiff bat, and big free-tailed bat utilize rock crevice roost sites to the greatest degree or exclusively (WBWG 2005) and would be the most affected species. The remaining 12 species primarily utilize mines, caves, trees, or other cavernous areas for roosts more often than crevice sites (WBWG 2005) and could be affected by blasting. However these 12 species are more adaptable in their roost preference, and would be impacted by blasting to a lesser degree.

The magnitude of these impacts on bats depends upon the number of turbines constructed and the amount of bat foraging and roosting habitat lost due to construction of the Project.

If the Project were constructed in two or more intervals, the amount of foraging or roosting habitat (if present) that would be lost or degraded at any given time would be reduced, but ultimately the amount of disturbance that would occur would be the same as if the Project were constructed in a single 12- to 18-month period.

Operations and Maintenance

During operations, potential impacts would occur to bats that encounter turbines. Bats could be killed by colliding with wind turbines, by barotrama, or a combination of the two (Baerwald et al. 2008, Grodsky 2011, Cryan and Barclay 2009). Barotrauma is a condition in which the lungs of bats are fatally damaged from the negative pressure created around operating turbines (Baerwald et al. 2008). The causes of fatal interactions are poorly understood (Cryan and Barclay 2009), but observations indicate that migratory tree bats and free-tailed bats are most susceptible to wind-turbine fatalities due to their flight characteristics and foraging ecology (Arnett et al. 2008). Of the 15 bat species that Thompson et al. (2011) documented in the survey area as described in Section 3.5.2.1, all could occur within the Project Area, and these include species that are more susceptible to fatal interactions with wind turbines than others.

Of the possible species that could occur in the Project Area, nine of these have been documented as fatalities at wind farms including the western red bat, big brown bat, silver haired bat, Mexican free-tailed bat, hoary bat, and big free-tailed bat (Thompson et al. 2011). Based on flight characteristics and foraging ecology (Thompson et al. 2011), the Mexican free-tailed bat, big-free tailed bat, hoary bat, silver-haired bat, and possibly Allen’s big-eared bat would be more susceptible to fatal interactions. Mexican free-tailed bats, big free-tailed bats, and western mastiff bats are vulnerable because their high foraging altitudes (WBWG 2005) include rotor swept heights of 77 to 492 feet (23.5 to 150 meters) above ground level. The big brown bat also is known to forage at higher altitudes that include the lower end of the rotor swept heights (Menzel et al. 2005), which also makes it somewhat vulnerable to fatal interactions. Of the species positively identified during baseline acoustic surveys for this Project, the western mastiff bat, Allen’s big-eared bat, and big free-tailed bat were detected at raised survey stations within the rotor swept area, 162 feet (49 meters) above the ground (Thompson et al. 2011). The hoary bat, silver-haired bat, and western red-bat are species of migratory tree bats that are among the most common group of bats with wind turbines fatalities (Arnett et al. 2008). The bats previously described as foraging along wash habitats typically forage near the ground or at the height of the vegetation canopy (WBWG 2005). These species would have little susceptibility to fatal interactions with wind turbines. Based on the likely relative abundance and susceptibility, Mexican free-tailed bats could comprise the majority of fatalities associated with wind turbines in the Project Area (Tetra Tech 2012b, Thompson et al. 2011).

Based on use frequency data during the monitoring studies and statistical comparison to two other wind energy sites (the Dry Lake facility in Navajo County, Arizona and the Dillon facility in Riverside County, California), Thompson et al. (2011b) projected that this Project could result in between 2.17 (Dry Lake fatality rate) and 4.29 (Dillon fatality rate) bat fatalities/MW/year (1,085 to 2,149 bat deaths per year operating at a maximum of 500 MW). In comparison with other western United States wind energy projects the estimated bat fatality rate varies from 0.24 to 13.40 bats per turbine per year (TetraTech 2012a). However, preconstruction surveys that measure relative abundance are not reliably correlated to post-construction fatalities of other wind farm sites, because the factors that contribute to bat deaths at wind farms are complex, poorly understood, and can be site-specific (NWCC 2010). Therefore, the projected fatalities for this Project are only the best available estimates. The proportional effects on the bat species populations cannot be predicted with certainty, but turbine deaths do not seem to be a source of population decline at existing wind facilities. However, they could be as more facilities come on-line in the future (NWCC 2010). Post-construction monitoring will be necessary to quantify the actual turbine-related impacts on bats from this Project.

Constructing the Project in two or more intervals would have similar effects; however, bat fatality rate could be lower during the initial intervals when fewer turbines would be operating. Although the individual fatalities would be detectable and measureable, the population-level impacts from the Project are unknown but would be expected to be negligible to minor according to the best available scientific information.

For this Project, Thompson et al. (2011) also concluded that the fatality rate could be lower than projected, due to the spatial and temporal patterns of bats using the Project Area and the small incidence of migratory tree bat species that occurred during spring and fall migration (Thompson et al. 2011). The Project Area had peak bat use during the spring, and fatality rates are far less common during the spring and most common during the late summer and fall at most wind farm sites in the country (Thompson et al. 2011). Also the comparable wind farm, the Dillon facility in southern California, had a similar seasonal pattern and has a smaller fatality rate (2.17 fatalities/MW/year). Thompson et al. (2011b) also presented data that spatial use of the Project Area may not be even. Based on acoustic monitoring, about a quarter of all bat activity occurred on the west slope of the mountains near Squaw Peak. It is unknown whether or not fatalities would be higher or lower in this area, because there is no evidence to suggest particular turbine locations within a wind farm or within a string of turbines are more likely to cause fatalities than others.

Emerging evidence suggests that increasing the cut-in speeds (the wind speed at which blades begin to operate) of rotors during the night can lessen the possibility of bat fatalities with little impact to energy production (Baerwald et al. 2009). Low wind speed tends to correlate with higher bat activity and higher turbine-related deaths (NWCC 2010), but the underlying processes causing this pattern are poorly understood (Arnett et al. 2011). Experiments that have shown promising results include wind farms in Pennsylvania (Arnett et al. 2011, Arnett et al. 2009) and western Canada (Baerwald et al. 2009) and involve tree roosting species, some *Myotis* species, and the big brown bat. This type of mitigation could be applicable to the Mohave wind farm site due to the Project involving some of the same species. However, curtailment has not been investigated in the deserts of the Southwest where the overall composition of species and habitat are different from the investigation sites in Pennsylvania and western Canada. The applicability to the Project Area is unknown. Specific conservation measures for bats are described in the Bat Conservation Strategy.

The Bat Conservation Strategy was developed using the USFWS Voluntary Wind Energy Guidelines. The Bat Conservation Strategy contains a detailed description of the post-construction mortality monitoring protocol and an adaptive management strategy to address impacts and to ensure an appropriate level of mitigation. BP Wind Energy would conduct standardized fatality monitoring during the initial two years after commercial operation. The results of the monitoring would be compared against thresholds that are tied into an adaptive management strategy, including strategies such as feathering (i.e., adjusting the turbine blades to not catch the wind), designed to minimize or mitigate impacts. Additional post-construction fatality monitoring may occur in Years 3 and 4 if the designated thresholds have been exceeded. Beginning in Year 5 and every five years thereafter, BP Wind Energy would conduct a single year of standardized post-construction fatality monitoring following the same approach used during the initial monitoring period.

The noise generated from operating turbines could impede echolocation of bats (Schaub et al. 2008, Carr 2010), which could decrease foraging efficiency of resident bats in the Project Area. There is some evidence that background environmental noise can reduce the foraging efficiency and foraging success of bats (Schaub et al. 2008, Carr 2010). However, the magnitude of the impact of commercial scale turbine noise on foraging bats is unknown.

Foraging areas, such as perennial water, are not known to occur in the Project Area thus there is little habitat available in the Project Area that would attract bats and put them at risk of collision. Roost habitats for cave-roosting bats such as abandoned mines are not known to occur in the Project Area, although there are numerous mines east of the Project Area, the nearest mine is approximately 1.7 miles (2.7 km) southeast of the southeastern corner of the Project Area. Rock outcroppings may provide roosts and hibernacula for cave and crevice roosting bats in the Project Area.

Decommissioning

The impacts on bats during the decommissioning period would be similar to that of the construction period. The removal of turbines and the other support infrastructure would create additional areas of ground disturbance that would reduce foraging opportunities until disturbed areas become vegetated after reclamation. The impacted species would most likely include the pallid bat, big brown bat, and canyon bat because these species have broad foraging habitats and can forage throughout the Project Area. However, the re-disturbed land would be small compared to the total available in the Project Area. Crevice roost sites in mountainous terrain in the Project Area could be disturbed if partial or full removal of turbine foundations occurs near a roost site. Decommissioning turbine foundations in rocky outcrops and mountainous terrain during parts of the year when bats are scarce would minimize potential roost disturbances.

Big Game

Impacts on big game species would principally involve mule deer. Desert big horn sheep would be extremely rare or absent from the Project Area, because suitable habitat is limited or lacking. Pronghorn are uncommon in the Project Area, as would be mountain lions, due to their naturally large home range size and low population density (Armstrong *et al*. 2011). Impacts would be inconsequential to all big game species, since their use areas are large and the area of disturbance small at the scale they use the landscape. The impacts described in the following sections could apply to any of these species but focuses on impacts on mule deer, and to a lesser extent, pronghorn.

Construction

Direct impacts on mule deer and pronghorn would occur during the construction process. Potential loss or degradation of habitat would include about 1,537 acres where vegetation in creosotebush desert scrub would be cleared for construction. Revegetation would reclaim foraging habitats on all but about 317 long-term disturbed acres. However, the revegetation process to baseline conditions for cover and plant composition could take decades (Arnett et al. 2007). The overall impacts to mule deer habitat would be minimal because the habitat modified by the Project would be very small in the context of the available habitat in the region for this common species.

Indirect, behavior-related impacts on mule deer and pronghorn also would occur during construction of the Project. Vehicles traveling in the Project Area and noises from blasting and other construction actions could initiate alert or flight responses. Noises and human activity also could lead to displacement of individuals, which could restrict movement and could result in larger avoidance areas and smaller populations in the Project Area (Arnett et al. 2007). Following the disturbances associated with construction, mule deer and pronghorn could habituate to the higher noise and activity levels in the longer-term. The degree to which these animals would adapt is uncertain (Barber et al. 2010), particularly because the Project Area already experiences noise and human activity from off-highway vehicle (OHV) use and other recreational activities to which they may have habituated. Behavior-related impacts would be moderate because mule deer and pronghorn populations may noticeably decrease during construction of the Project due to avoidance.

Impacts on pronghorn and mule deer would be the similar if construction of the Project was completed in two or more construction intervals. Construction intervals would result in a temporal increase in construction related noise, traffic and human activity; however, it could reduce the area avoided by mule deer and pronghorn as construction activities could occur in a smaller area.

Operations and Maintenance

Following completion of construction, the disturbance levels from heavy equipment and humans would diminish and the primary disturbances would be associated with operations and maintenance personnel, occasional vehicular traffic, and the presence of turbines and other facilities. Disturbance to mule deer, pronghorn, and other game species associated with maintenance once the Project is operational would be expected to be low. Direct habitat modifications are not expected to fragment or impact movement of big game in the Project Area. As indicated in Table 2-6, the spacing between turbines within the corridor would be about 1,000 feet to 1,900 feet apart. There would be no long, linear fences installed that could interfere with pronghorn or mule deer movements (the only fencing would be around individual structures such as the O&M building and Project substation). To date, the long-term displacement effects of wind development on the habitats of big game species is largely unknown. Some studies suggest, however, that mule deer and other large ungulates are not displaced in the long-term during wind energy project operations (Arnett et al. 2007). Potential impacts to game species as a result of the operating wind farm would be minimized through the implementation of mitigation measures and BMPs.

Decommissioning

During decommissioning, behavior-related impacts would continue, when noises and actions would be similar to those during construction. Decommissioning also would reintroduce surface and ground disturbance impacts on habitats, which would be similar to disturbance during construction.

Wild Burros

Construction

The extent to which wild burros utilize the Project Area is unknown; however, wild burros occur in the Black Mountains Habitat Management Area to the west of Project Area and could utilize the Project Area occasionally. Impacts on wild burros would be similar to the impacts on big game. Should burros utilize the Project Area, individuals could be temporarily displaced from the site with the influx of humans, vehicular traffic, heavy construction equipment, and blasting.

Operations and Maintenance

Burros may be less likely to utilize the Project Area because of the human activity, vehicular traffic, turbine movement, and the associated noise disturbance. However, the level of human activity would be less than during the construction or decommissioning and burros may habituate to the turbine movement and noise.

Decommissioning

The impacts on wild burros would be the same as during construction.

Birds

Resident and Migratory Birds

Construction

Direct impacts on resident and migratory birds would occur during the construction process. Potential loss or degradation of habitat would include 1,537 acres where vegetation would be cleared for construction. Revegetation would restore habitats on all but about 317 acres needed for Project features. These impacts would not impact all species equally due to differences in habitat use in the Project Area.

Behavior-related impacts on resident and migratory birds also would occur during construction of the Project. Vehicles traveling in the Project Area and noises from blasting and other construction actions could initiate alert or flight responses or interfere with vocal communication and breeding success. Noises and human activity also could lead to displacement of individuals of some species (Arnett et al. 2007). In the long-term resident and migratory birds could habituate to the higher noise and activity levels, but the degree to which these animals would adapt is uncertain (Barber et al. 2010).

Mortality of resident and migratory birds could occur during construction from multiple sources. Vehicles and construction equipment traveling in the Project Area could collide with birds that flush. However, the 25 mph speed limit would limit or eliminate such interactions. When land is cleared, nests, eggs, or nestlings could be crushed during the breeding season. However, preconstruction surveys could identify occupied nests, and clearing in the vicinity would be avoided to the extent possible until the resident birds fledge or the nest is abandoned or lost by natural means. Also, the impact could be avoided by limiting land clearing to the 7-month non-breeding season (roughly July 1 to February 1 [McCreedy et al. 2009]).

Impacts on resident and migratory birds would be similar if the Project was constructed in two or more intervals. Construction intervals would extend the duration of construction-related noise, traffic and human activity. However, it could reduce the size of the area avoided by resident and migratory birds because construction activities during each interval would occur in a smaller area than if the entire Project was developed in a single interval.

Operations and Maintenance

During operations and maintenance, potential direct impacts would occur to resident and migratory birds that encounter turbines. Resident and migratory birds could be killed by colliding with wind turbines in operation, with stationary blades, or with the support structure (Arnett et al. 2007). Observations indicate that around half the reported fatalities at new generation wind power facilities are of nocturnally migrating birds, primarily passerines, and the other half are resident birds in the area (Arnett et al. 2007). The timing of fatalities at eight western and mid-western wind farms indicate that fatalities can occur in all months of the year but peak during spring and fall migration in some parts of the country (Arnett et al. 2007).

Thompson et al. (2011b) concluded that passerines made up a large proportion of the birds observed during the baseline studies and would be expected to make up the largest proportion of fatalities at this wind facility. The exposure risk for passerines and other small bird species was considered to be low, based on the bird exposure index, which is used as a relative measure of how often birds fly at heights similar to operating blades of modern wind turbines (Thompson et al. 2011). Only the northern rough-winged swallow (*Stelgidopteryx serripennis*) had an exposure index greater than zero (meaning the bird flight patterns may coincide with the rotor heights and making them more vulnerable to turbine collisions). This was the only small bird species that was observed flying within the rotor swept height (Thompson et al. 2011). It was observed twice and was observed both times flying at rotor swept height. The common raven (*Corvus corvax*) was the only non-raptor and non-passerine that had a exposure index greater than zero (0.07), with more than 86 percent of the observations occurring at rotor swept heights (Thompson et al. 2011). The exposure index was based primarily on observations of resident species, which are typically moving locally and flying at low altitudes, and does not likely capture the risk to nocturnal migrants, which typically fly at greater heights and are at risk when ascending and descending from nightly migration flights (USFWS 1998, Young et al. 2007 *cited in Thompson et al. 2011*). Thompson et al. (2011) concluded that it would be unlikely that non-raptor populations would be adversely affected by direct mortality from the operation of the wind energy facility; the impact would be minimal.

The Project Area is not a known migratory corridor and migrating passerines typically fly well above the turbine rotor sweep area except when landing or taking off (Thompson et al. 2011). Thompson et al. (2011) noted that their studies were not designed to detect nocturnal migrants, but their results indicated that the Project study area does not act as a significant stopover site for nocturnal migrants that would be at risk during takeoff and landing. A total of 15 potential migrant species were observed during baseline surveys with only the sage thrasher (27 total records) having more than three observations (Thompson et al. 2011). Possible migrant species represented only about 7.5 percent of the bird observations, and none had an exposure risk to operating turbines. Consequently, the risk of mortality to nocturnal migrants would be minor due to the infrequent use of the area and possible low exposure risk.

While nocturnal migrants may be attracted by the red aviation warning lights on the turbines and met towers, studies conducted by the University of Michigan indicate that flashing lights, which are proposed in the Project, reduce the attraction and collisions by 50 to 71 percent compared to steady red lights (Gehring et al. 2009). Kerlinger et al. (2010) showed that bird mortality within a wind farm was no different between wind turbines without night lighting and those with flashing night lighting. Consequently, the two color options for wind turbines that vary the number of lights in the wind farm would have a similar impact on nocturnal migrants.

Constructing the Project in two or more intervals would have similar effects on resident and migratory birds; however, the fatality rate of resident and migratory birds could be lower during the initial intervals when fewer turbines would be operating.

Migratory birds and resident birds also could experience fatal interactions from collision with other man-made objects in the Project Area. The met towers, above ground collector lines (if used), substations and other facilities, and fences in the Project Area would increase the risk of fatal collisions. The Project option of burying all collector lines would slightly reduce the possibility of fatal collisions with other infrastructure. Any impact would be minimal to these species.

The noise generated from operating turbines could lead to the indirect impact of displacing birds or impeding local breeding of resident songbird species by masking courtship breeding songs (Barber et al. 2010). The magnitude of the impact is unknown (Arnett et al. 2007), but the effects would likely remain localized near turbine corridors and dissipate further from the corridors. Noise and human disturbance during maintenance activities could initiate flight responses and disrupt normal behavior in the short-term; however, these incidents would be periodic and would minimally affect bird behavior in the long-term operation of the facility.

Decommissioning

The impacts on migratory birds during the decommissioning period would be similar to that of the construction period. The removal of turbines and the other support infrastructure would create additional areas of ground disturbance that would slightly reduce the quality and quantity of habitat until disturbed areas become vegetated after reclamation. Behavioral responses and reduced use of the facility could result from the increased noise and human disturbance during this period.

Raptors

Construction

Direct impacts on raptors (excluding golden eagles, which are discussed separately below) would occur during the construction process. Potential loss or degradation of habitat would include 1,537 acres potential foraging habitat, where vegetation would be cleared for construction. Revegetation would restore habitats on all but about 317 long-term disturbed acres, but recovery of prey in reclaimed areas would be long-term. This could reduce prey populations in the localized areas of disturbance and reduce local foraging efficiency. Consequently, raptors could be forced to forage over a larger area, but the literature suggests that avoidance or displacement would be uncommon (Arnett et al. 2007). Red-tailed hawk would be the most common raptor impacted, based on relative abundance documented during baseline surveys (Thompson et al. 2011). The overall impacts on habitat would be minimal.

Behavior-related impacts on raptors also could occur during construction of the Project. Vehicles traveling in the Project Area and noises from blasting and other construction actions could initiate alert or flight responses, and inhibit vocal communication (direct impacts). However there is little evidence to suggest that indirect behavioral impacts influencing breeding success or leading to displacement occurs regularly (Arnett et al. 2007). In the long-term, raptors could habituate to the higher noise and activity levels (Barber et al. 2010), and numerous studies indicate that hawks, and particularly red-tailed hawks, are tolerant of human activities (Romin and Muck 1999).

The magnitude of these impacts on raptors depends upon the number of turbines constructed and the amount of raptor foraging and roosting habitat lost due to construction of the Project. Impacts on raptors from construction intervals would result in temporal reduction in the number of turbines constructed and therefore reduce the total amount of foraging or roosting habitat lost during any given time period.

Operations and Maintenance

During operations and maintenance, raptors would potentially encounter turbines and could be killed by rotating blades (Arnett et al. 2007). Thompson et al. (2011b) concluded that raptor use of the Project Area was small. The authors estimated a fatality rate of less than 0.01 fatalities/MW/year, or less than 5 raptor fatalities per year if the facility operates at a 500 MW capacity. Thompson et al. (2011b) concluded that because red-tailed hawks are the most common species occurring in the area throughout the year, and because this species has higher exposure index than other raptor species, red-tailed hawk fatalities would be more likely than other raptor species found in the Project Area. The impact from collisions would be moderate for red-tailed hawk, because the number of annual fatalities to individuals would be detectable in the Project Area but would not likely translate to differences in the larger surrounding population. Constructing the Project in two or more intervals would have similar effects on red-tailed hawks and other raptors; however, the fatality rate of could be lower during the initial intervals when fewer turbines would be operating. The annual fatalities of other raptor species would be minor, because the number of fatalities would not be readily apparent in the Project Area or surrounding population.

To date, turbine caused deaths do not seem to be an important source of mortality for raptors at most wind energy facilities in the country, but fatalities could increase as more facilities are developed in the future

(NWCC 2010). Post-construction monitoring will be necessary to quantify the actual turbine-related impacts on raptors from this Project.

It is also possible that raptors could experience fatal strikes with other human-made objects in the Project Area. The met towers, above ground collector lines, substations, transmission lines, switchyard, and fences in the Project Area would increase obstructions in the environment and increase the risk of fatal collisions with this other infrastructure. Collector lines also would increase the potential for electrocution of raptors. Adherence to modern design criteria would follow Avian Power Line Interaction Committee (APLIC) guidelines, which would minimize the likelihood of this impact. The Project option of burying all collector lines would further reduce the potential for fatal collisions and electrocution of raptors at distribution lines.

The noise generated from operating turbines could impede local use of the Project Area (Barber et al. 2010). However, this indirect impact is unlikely to affect raptor use of the Project Area in the long-term (Arnett et al. 2007). Noise and human disturbance during maintenance activities could initiate flight responses and disrupt normal behavior in the short-term; however, these incidents would be periodic and would minimally affect raptor behavior in the long-term operation of the facility.

Decommissioning

The impacts on raptors during the decommissioning period would be similar to that of the construction period. The removal of turbines and the other support infrastructure would create additional areas of ground disturbance that would slightly reduce the quality and quantity of forage habitat until disturbed areas become vegetated after reclamation. Short-term behavioral responses could result from the increased noise and human disturbance during this period, which would be similar to the construction period. Impacts would be minimal.

Game Birds

Gambel's quail and the mourning dove are the only game birds documented in in the Project Area (Thompson et al. 2011). This subsection discusses impacts on Gambel's quail. Impacts on the mourning dove would be similar to the impacts described above in the subsection on resident and migratory bird species.

Construction

Direct impacts on Gambel's quail would occur during the construction process. Potential loss or degradation of habitat would include 1,537 acres where vegetation would be cleared for construction. Revegetation would restore habitats on all but about 317 acres that would be needed for Project features. However, only a portion of the disturbance area likely is occupied by Gambel's quail. The species would be most common in the vicinity of wash habitats where vegetation provides a greater amount of cover and food resources. Loss, fragmentation, or degradation of habitat could reduce available forage and decrease escape cover, which would indirectly increase the potential for predation. Increased predation could decrease local populations of the species (Brennan et al. 2005). Exposure to predation and loss of forage would occur in small areas where Project facilities cross washes and would not be readily apparent outside of these places. Therefore, the effective loss of habitat for Gambel's quail from the Project would be small enough that local coveys would be conserved with minimal impact.

Ground disturbing activities and increased truck travel in the Project Area could lead to the establishment or increase of invasive plants or noxious weeds, which could have the indirect impact of reducing forage for Gambel's quail. Weed control measures would help to avoid the spread and impacts to forage, and any impacts would be minimal in Gambel's quail habitat.

Indirect, behavior-related impacts on Gambel's quail also could occur during construction of the Project, and would be short-term. Vehicles traveling in the Project Area and noises from blasting and other construction actions could initiate alert or flight responses, inhibit vocal communication and breeding success, or lead to abandonment of nesting areas. In the long-term, Gambel's quail could habituate to the higher noise and activity levels, but the degree to which this species would adapt is uncertain (Barber et al. 2010).

Similar to the impacts described for migratory and resident birds, impacts on game birds including Gambel's quail would be similar if the Project were constructed in two or more intervals to coincide with secured power purchase agreements. Construction intervals would extend the duration of construction-related noise, traffic and human activity. However, it could reduce the total area avoided by Gambel's quail at any one time as construction activities could occur in a smaller area.

Operations and Maintenance

Thompson et al. (2011b) calculated the exposure index of Gambel's quail in the Project Area. No observations occurred within rotor swept heights, which resulted in the calculation of zero potential of exposure for fatality from wind turbines in the Project Area. Because of the habit of this species for short escape flights is near the ground surface, it would be unlikely for this species to collide with other infrastructure in the Project Area. There would be no direct impact for mortality from turbines or other infrastructure.

The noise generated from operating turbines could have the indirect impact of impeding local use of the Project Area (Barber et al. 2010). However, the long-term magnitude of the impact is unknown on this species. Noise and human disturbance during maintenance activities could initiate flight responses and disrupt normal behavior in the short-term; however, these would be periodic and would not significantly affect local flocks of Gambel's quail in the long-term. Overall noise impacts would be minor to moderate during operations.

Impacts on Gambel's quail would be similar if the Project was constructed in two or more intervals. Construction intervals would extend the duration of construction-related noise, traffic and human activity. However, it could reduce the size of the area avoided by Gambel's quail because construction activities during each interval would occur in a smaller area than if the entire Project were developed in a single interval.

Decommissioning

Impacts on the Gambel's quail from the decommissioning activities would be similar to that experienced under construction. The short-term nature of Project decommissioning would make this impact minimal.

Reptiles and Amphibians

Construction

The types of direct and indirect impacts on reptiles (desert tortoise is discussed in the special status species subsection) and amphibians would be the same as those described for small mammals. These would include impacts from habitat loss and degradation, injury or death during land clearing activities, weed infestations, collisions with vehicles, and exposure to open trenches. The area of short-term ground disturbance would mostly occur in creosotebush desert scrub (about 1, 424 acres) and rocky outcrops or mountainous habitats (approximately 67 acres).

The ground disturbance impacts on amphibians could affect the red-spotted toad and Great Plains toad that could occur in limited areas in creosotebush desert scrub habitats where temporary pools develop.

Micro-siting could avoid habitats for these species to the extent possible, and direct impacts from lost habitat would be minor due to the limited amount of potential habitat.

Species of reptile that could be impacted in the affected habitats are listed in Table 4-11. Impacts on reptiles in creosote desert scrub would be moderate, because total acres disturbed would be only about 3 percent of the available habitat. However, indirect impacts from weed encroachment could degrade a larger proportion of habitat. Impacts on species in rocky outcrops and mountainous areas would be minor, because less than 50 acres in these areas are likely to be disturbed.

Impacts on reptiles and amphibians would be the same if construction of the Project was completed in two or more construction intervals. Construction intervals could increase the duration of construction activities and result in a temporal increase in construction-related noise, traffic and human activity, but reduce the extent of total ground disturbance during a given time period. Indirectly, if the reclamation success was improved from adaptive management, this could reduce the effects on the population of some reptiles and amphibians in localized areas compared to building the entire Project in a single interval.

Table 4-11 Reptile Species Potentially Impacted by Habitat Disturbance During Project Construction

Creosote Desert Scrub Species	
Glossy snake (*Arozona elegans*)	Long-nosed leopard lizard (*Gambelia wislizenii*)
Spotted leaf-nosed snake (*Phyllorhynchus decurtatus*)	Desert iguana (*Dipsosaurus dorsalis*)
Coachwhip (*Coluber flagellum*)	Zebra-tailed lizard (*Callisaurus draconoides*)
Gopher snake (*Pituophis catenifer*)	Desert horned lizard (*Phrynosoma platyrhinos*)
Long-nosed snake (*Rhinocheilus lecontei*)	Desert spiny lizard (*Sceloporus magister*) primarily near washes
Desert night snake (*Hypsiglena chlorophaea*) also mountainous	Yellow backed spiny lizard (*Sceloporus magister*)
Western patch-nosed snake (*Salvadora hexalepis*)	Ornate tree lizard (*Urosaurus ornatus*) primarily near washes
Western diamondback (*Crotalus atrox*)	Common side-blotched lizard (*Uta stansburiana*)
Mohave rattlesnake (*Crotalus scutulatus*)	Tiger whiptail (*Aspidoscelis tigris*)
Western banded gecko (*Coleonyx variegatus*)	Desert tortoise (*Gopherus agassizii*) also mountainous, less steep slopes
Rocky Outcrop and Mountainous Species	
Striped whipsnake (*Coluber taeniatus*)	Greater short-horned lizard (*Phrynosoma hernandesi*)
Speckled rattlesnake (*Crotalus mitchellii*)	Desert night lizard (*Xantusia vigilis*)
Great basin collared lizard (*Crotaphytus bicinctores*)	Desert tortoise (*Gopherus agassizii*) also creosotebush scrub
Gila monster (*Heloderma suspectum*)	Desert night snake (*Hypsiglena chlorophaea*) also creosotebush scrub
Common chuckwalla (*Sauromalus ater*)	

SOURCE: Brennan 2008

Operations and Maintenance

Impacts on reptiles and amphibians would be the same as those described for small mammals, which would include indirect impacts from invasive plant species or noxious weeds and exposure to chronic noise. Invasive plants or noxious weeds could degrade habitat but impacts would be moderate to minor depending on the success of weed control and site specific species habitat needs. As has been shown in some frog species (Barber et al.2010), chronic noise could mask breeding calls for the two toad species, and could have the indirect impact of decreasing reproductive success if either the Great Plains toad or red-spotted toad are not able to accommodate increased noise in the environment. The noise levels likely would not be high enough to impact reptiles. The impact to the two toad species would be minor, due to the possible limited exposure. The impact to reptiles would likely be inconsequential in the Project Area.

Decommissioning

Impacts on reptiles and amphibians would be the same as those described for small mammals. The removal of turbines and the other support infrastructure would create areas of degraded habitat from ground disturbance that would have marginal value until these areas become vegetated after reclamation.

4.5.2.5 Wildlife Movement Corridors

To date, no specific wildlife corridors have been identified in or near the Project Area. Disturbing blocks of contiguous vegetation would reduce local habitat connectivity, which could impede movement of wildlife within the Project Area. Pronghorn, mule deer, desert tortoise and reptile movement would all be impeded during the 18 months of construction; 317 acres of habitat connectivity would be impaired in the long-term where facilities exist on the landscape, and about 1,537 acres would be altered in the short-term, until the natural vegetation pattern can be restored. Restoration can take several decades in the desert, where plants are slow growing. Wildlife linkages are known to be affected by roads, urbanization, railroads, energy corridors and increased human activities (ADOT 2006). Habitat fragmentation is well documented as a barrier that isolates wildlife populations and disrupts ecological functions such as gene flow, predator-prey interactions, and migration (ADOT 2006). Impacts from disturbance and infrastructure would affect about 3 percent of the available habitats in the Project Area during the long-term, which could minimally impair wildlife movement in the long-term.

Constructing the Project in two or more intervals would increase the duration of construction, which could increase the amount of time when wildlife movement might be impeded. However, construction intervals would reduce the extent of the area disturbed, and may reduce effects on wildlife movement from Project construction. No regionally important wildlife movement areas would be impacted.

4.5.2.6 Special Status Plants

Federally Listed Plants

There are no Federally listed plant species or habitats in the Project Area or surrounding vicinity (Flaig 2009, Werner 2011), and the USFWS determined that no plant species Federally listed as threatened or endangered or with designated critical habitat would be affected by the Project. Therefore, there would be no direct or indirect impacts on Federally listed plant species from any of the Project alternatives or if the Project were constructed in two or more intervals.

BLM Sensitive Plants

Construction

Silverleaf sunray is the only BLM sensitive plant that could occur in the Project Area, but no individual plants or populations were identified during baseline native plant surveys (Flaig 2009, Werner 2011). Due to its general habitat requirements of dry slopes, sandy washes, clay, and gypsum cliffs, the disturbance to suitable habitat for this species is based on the entire extent of ground disturbance in the Project Area. The potential loss or degradation of habitat for the silverleaf sunray would include 1,537 acres where vegetation would be cleared during construction; however, only a portion of the Project Area contains the general habitat requirements and could be suitable for this species. Trampling suitable habitat also could occur and result in direct impacts from the damage or loss of potential habitat. Impacts on individual plants could be short-term and minor if only portions of the plant were damaged, however, loss of individual plants and disruption of the seed bank in the soil would be long-term. Reclamation and revegetation using conserved topsoil would restore suitable habitats on all but about 317 acres. Although subsequently reclaimed, the previously disturbed areas may not be able to support this species. This would result in an indirect minor long-term impact from the loss of suitable habitat. Preconstruction surveys to detect populations of the species would identify sensitive areas to avoid disturbance where practicable, however in site-specific areas where this is not possible, individual plants could be transplanted and seed collected for distribution at a suitable site within the Project Area.

Indirect impacts on suitable habitat for species would involve the potential spread of noxious weeds and introduced plant species and their potential to alter wildland fire regime and return intervals. These long-term indirect impacts could degrade suitable habitat however, development of and adherence to an Integrated Reclamation Plan could minimize these impacts resulting in minor indirect impacts on suitable habitat for this species.

Although most collector lines would be in areas disturbed for short-term access roads, the Project option of using a combination of underground and aboveground collector lines in comparison to all underground collector lines provide greater flexibility of siting collector lines. This would offer more potential to avoid suitable silverleaf sunray habitat, should this species occur within the disturbance footprints.

Construction intervals would result in the same impacts on silverleaf sunray as the extent of ground disturbance and the potential loss or degradation of habitat would eventually be the same. Reclamation would be initiated and vegetation could become established prior to the disturbance associated with a future construction interval, which would allow the opportunity to use adaptive management to improve subsequent reclamation techniques.

Operations and Maintenance

Potential indirect impacts on suitable silverleaf sunray habitat from noxious weeds and introduced plant species would persist during operations and maintenance. The potential long-term minor impact would decrease as human activities decrease in the Project Area and as revegetated areas mature.

Decommissioning

Similar to the indirect impacts described under construction, disturbance of suitable habitat for the silverleaf sunray would occur during decommissioning from ground disturbance. Any known populations would have been avoided during construction as well as operations and maintenance, to the extent practicable. Ground disturbance to remove Project facilities and turbines could result in long-term minor indirect impacts on suitable habitat for this species. However, because the Project Area contains suitable habitat and populations could shift geographically during the life of the Project, the potential for long-term indirect impacts likely would occur during decommissioning.

Ground disturbance during decommissioning would reintroduce the potential impact of spreading noxious weeds and introduced plant species that could degrade habitat for the silver-leaf sunray. This long-term indirect impact would continue to be minimized due to adherence to reclamation and weed management procedures resulting in minor effects on suitable habitat for this species.

Protected Arizona Native Plants

Construction

Las Vegas bear poppy, cottontop cactus, straw-top cholla, and Navajo Bridge cactus are protected native plants that occur or potentially occur in the Project Area based on HDMS review (AGFD 2010b). Cottontop cactus is the only one of these that has been documented in the Project Area (Flaig 2009). Other salvage restricted species such as cactus, Joshua tree, Mohave yucca, and ocotillo also occur in the Project Area but were not identified in the HDMS review (Flaig 2009). Direct impacts on these species during construction would be similar to those described in the previous subsection for the silverleaf sunray except there could be the loss of individual cottontop cactus and other salvage restricted plants. This would result in a minor direct impact if it reduced the number of individual plants within the Project Area. The only appreciable difference between these species and the silverleaf sunray is that salvage restricted species can either be avoided to the extent possible, transplanted, or salvaged on site for future revegetation and reclamation in the Project Area, or payment of a fee may be made based on A.R.S. § 3-903(B)(2) (Franson 1995, Matthews 1994). Preconstruction surveys to identify populations of these species could identify avoidance areas where practicable; however in site-specific areas where this is not possible, individual plants could be transplanted to a suitable site within the Project Area. Direct impacts would be mitigated by following native plant salvage measures developed in a plant salvage plan for the Project. Reclamation, plant salvage and revegetation would reduce long-term indirect impacts on individual plants and their habitat.

Constructing the Project in intervals to coincide with secured power purchase agreements would result in the same impacts on Arizona native plants as the extent of ground disturbance and the potential loss or degradation of habitat would eventually be the same. Reclamation would be initiated and vegetation could establish prior other areas being disturbed during a future construction interval. This delay in disturbance would allow the opportunity to use adaptive management to improve the success of subsequent reclamation.

Operations and Maintenance

Potential long-term, minor indirect impacts from noxious weeds and introduced plant species would persist during operations and maintenance. The potential long-term minor indirect impact would decrease as human activities decrease in the Project Area and as revegetated areas mature.

Decommissioning

Similar to the direct and indirect impacts described under construction, disturbance of suitable habitat for the protected Arizona native plants would occur during decommissioning from ground disturbance. Any known populations would have been avoided during construction as well as operations and maintenance, to the extent possible, and ground disturbance to remove Project facilities and turbines could result in minor direct and indirect impacts. However, populations could shift geographically during the life of the Project, and thus the potential for long-term minor direct and indirect impacts likely would occur during decommissioning.

Ground disturbance during decommissioning would reintroduce the higher potential impact of spreading noxious weeds and introduced plant species and indirectly degrade habitats for protected Arizona native plant species. This impact would continue to be minimized due to adherence to reclamation and weed management procedures resulting in long-term minor indirect impacts on suitable habitat.

4.5.2.7 Special Status Wildlife

Federally Listed Wildlife

No Federally listed threatened or endangered wildlife species or designated critical habitat occurs in the Project Area (Werner 2011). The California condor periodically utilized the region in the early 2000s, but has since trended its use north and east of the region. Reintroduced California condors have been expanding their foraging range to the north and northeast of their release site near the Grand Canyon and have not utilized areas south of the Grand Canyon since about 2000 (USFWS 2010b). Furthermore, the USFWS determined that no animal species Federally listed as threatened or endangered or designated critical habitat would be affected by the Project (Werner 2011). No impact on the California condor or other animal species currently listed as Federally threatened or endangered is anticipated during the life of the Project.

Construction

The Sonoran desert tortoise (or Morafka's desert tortoise) is a Federal candidate species that inhabits the Project Area. Direct and indirect impacts on this species could occur throughout the life of the Project under all Project alternatives.

The long-term indirect impact from the potential loss or degradation of desert tortoise habitat would include Category III habitat where approximately 524 acres of vegetation would be cleared during construction. Dispersal of desert tortoises within their home ranges along vegetated washes would experience minor local habitat loss where access roads cross washes. The development of access roads and utility corridors would reduce the integrity of existing tortoise habitat in the Project Area and could increase the potential for direct long-term impacts on individuals from vehicle-caused mortality. Long-term, the reduction in habitat integrity could result in minor indirect impacts on the tortoise population if it reduced habitat quality within the home range of an individual tortoise. The loss of individual tortoises, burrows, and habitat integrity could result in a minor long-term reduction in the number of desert tortoises with home ranges in the Project Area (Baxter 1988, Grover and DeFalco 1995, and Boarman 2002). The development of Project features such as roads, and foundations for turbines or other facilities could result in new areas for the construction of burrows. In the long-term, this minor effect could indirectly help maintain burrow sites and the tortoise population within the Project Area (Lovich and Daniels 2000). Indirectly, the development of roads in the Project Area could increase opportunities for the public to handle or collect tortoise. In the long-term, this minor effect could indirectly reduce the tortoise population within the Project Area (Lovich and Daniels 2000).

Reclamation and revegetation would restore habitats on all but about 190 acres that would be required for Project features. Mitigation is possible by avoiding areas with high quality habitat characteristics for the species, which would be determined through pre-construction surveys to determine areas occupied by the species within the Project limits of disturbance. Preconstruction surveys would be used to prevent the loss of individual tortoises that could be in the path of ground clearance activities. Tortoises found in these situations would be handled according to Arizona Game and Fish Department (AGFD) guidelines for handling tortoises on construction projects. Loss of desert tortoise habitat would be mitigated in accordance with BLM Instructional Memorandum AZ-2012-031, which establishes a policy to mitigate for impacts to desert tortoises and their habitats, including compensation for residual impacts that cannot otherwise be mitigated.

Indirect impacts on habitat would involve the potential spread of noxious weeds and introduced plant species and their potential to alter wildland fire regime and return intervals. These impacts could reduce the quality of local food resources and, in the event of fire, reduce habitat quality from the loss of forage or potentially harm individual tortoises. However, development of and adherence to an Integrated

Reclamation Plan could minimize direct and indirect impacts on individuals and habitats over the life of the Project.

Although most collector lines would be in areas disturbed for access roads, the Project option of using a combination of underground and aboveground collector lines in comparison to all underground collector lines would provide greater flexibility of siting collector lines. This would offer more potential to avoid tortoise habitat and reduce long-term minor indirect effects on habitats.

Blasting for turbine foundations or access roads could occur in or near tortoise burrows. The shock from blasting could cause collapse of this type of burrow resulting in short-term direct impacts. However, preconstruction surveys near where blasting activities could occur would locate burrows and subsequently any tortoises or burrow and the contents would be removed. This would reduce mortality and direct impacts on individuals and would help maintain existing populations in the long-term. Active or good quality burrows can be reinforced with wadded paper prior to blasting, which would minimize the possibility of burrow collapse (USFWS 2007). This procedure would be conducted by a permitted biologist trained to handle tortoises and work with burrows.

Vehicles traveling along Project roads could crush and kill individual tortoises resulting in direct impacts on the individuals and indirectly reducing the population of tortoises in the Project Area. However, the 25 mph speed limit would allow BP Wind Energy to identify tortoises in roadways and to avoid collisions reducing the direct impact on individual tortoises and long-term indirect impacts on populations in the Project Area.

Constructing the proposed Project in intervals could reduce in the total area where construction and human activity occurs during a given time period, but since the entire Project would eventually be built, impacts from construction intervals would be the same as those previously identified in the analysis for constructing the Project in a single interval. The magnitude of the potential impacts to desert tortoise would be dependent upon the density and location of infrastructure constructed. Construction intervals could result in a temporal reduction in the amount of ground disturbance within Category III desert tortoise habitat and improve reclamation success. Indirectly this could reduce the temporal loss or degradation of desert tortoise habitat if vegetation became established prior to disturbance during a future construction interval. This would allow the opportunity to adapt management strategies based on past success, which could improve the success of subsequent reclamation.

Operations and Maintenance

Long-term indirect impacts on tortoise habitat could occur from the possibility of noxious and invasive weed infestation and would persist during operations and maintenance. Areas infested with noxious weeds and invasive plant species would indirectly reduce the quality of tortoise habitat, but the magnitude would reduce to negligible as reclamation progresses, and as revegetated areas mature.

The possibility for collisions with vehicles could occur along Project roads resulting in a direct loss of individuals and indirectly reduce the population of tortoises in the Project Area. However, the 25 mph speed limit would still apply and the amount of operations and maintenance traffic would be reduced compared to traffic during construction.

Decommissioning

The direct and indirect impacts on desert tortoises and habitat during decommissioning would be similar to that during construction. Collisions with vehicles during decommissioning would result in the direct loss of individual tortoises, and a long-term reduction of tortoise populations in the Project Area. Ground disturbance caused by removal of turbines and the other support infrastructure would indirectly reduce the quality of habitat surrounding those areas until reclaimed and revegetated. Prior to decommissioning, the disturbance areas from removal of all infrastructure, including turbine foundations, would be searched for burrows and individual tortoises by a trained tortoise monitor to prevent injury or death to individual tortoises.

Ground disturbance during decommissioning would reintroduce the higher potential impact of spreading noxious weeds and introduced plants and could, if established, indirectly degrade tortoise habitats long-term. But the long-term indirect impact would be minor due to adherence to reclamation and weed management procedures.

Similar to construction, removal of turbine foundations could reestablish the possibility of earthen burrows collapsing due to ground vibrations in the surrounding area. Applying the same mitigation measures as during construction would reduce this impact.

BLM Sensitive Wildlife

Construction

Three bat species that could occur in the Project Area are categorized as BLM sensitive species. These include Allen's big-eared bat, greater western mastiff bat, and Townsend's big-eared bat. There would be a long-term loss of a minor amount of foraging habitat for Townsend's big-eared bat in wash habitats that are intersected by Project roads. Foraging habitat for Allen's big-eared bat and greater western mastiff bat are not tied to vegetation in the Project Area, and would not be affected by construction.

Mine roost sites that were identified outside the Project boundary would not be impacted by the Project, but crevice roost sites in mountainous terrain in the Project Area could be disturbed if blasting for turbine foundations occurs near a roost site. The mountains surrounding Squaw Peak have the most suitable habitat of this type in the study area. The greater western mastiff bat is the only species among these that exclusively uses crevice sites for roosting (WBWG 2005). Townsend's big-eared bat typically roost in caves and mines, and would be undisturbed by blasting during construction. The impact could be mitigated by avoiding areas with potential roost sites to the extent possible or by blasting during periods of the year when bats are scarce. Impacts on bats are detailed in Section 4.5.2.4.

BLM sensitive bird species that were documented or that potentially occur in the study area include the western burrowing owl, gilded flicker, American peregrine falcon, and golden eagle. Impacts on these species would include loss or degradation of habitat, which would be minimal because 3 percent or less of the habitat for each of these species within the Project Area would be affected by ground disturbances. These impacts are detailed in Section 4.5.2.4 for migratory birds and raptors. Potential impacts on the golden eagle are discussed below in this subsection.

Pre-construction surveys for burrowing owls would be completed prior to commencement of construction activities in accordance with AGFD's Burrowing Owl Project Clearance Guidance for Landowners (AGFD 2009b). In accordance with AGFD (2009b), a 100-foot radius buffer, excluding all heavy machinery and foot traffic would be set around all active burrows during construction. If burrowing owls or active or potentially active burrows are located within the Project long-term disturbance boundaries, further mitigation may include excluding owls from disturbed burrows prior to construction and/or providing artificial burrows on-site or in an off-site location if suitable habitat is not available on-site.

Constructing the Project in two or more intervals could result in a temporal reduction in the total area avoided by sensitive wildlife species due to increased human activity, but since the entire Project would be eventually constructed, impacts would be the same as those resulting identified in the analysis for constructing the Project in a single interval. The magnitude of the potential impacts on sensitive species would depend on the density and location of infrastructure, which would not be altered if the Project were constructed in two or more intervals. Construction intervals could reduce the amount of ground disturbance in any given interval and improve reclamation success if vegetation became established prior to disturbance during a future construction interval. This would allow the opportunity to adapt management strategies based on past success, which could improve the success of subsequent reclamation. Indirectly this could reduce the temporal loss or degradation of sensitive species habitats.

Operations and Maintenance

Impacts on the sensitive bat species would not differ from those described in Section 4.5.2.4, including the long-term potential for fatal interactions with wind turbines, which were described as small by Thompson et al. (2011b). The greater-western mastiff bat and Allen's big-eared bat were documented during baseline studies as flying at heights within the rotor sweep area.

BLM sensitive bird species that were documented or that potentially occur in the Project Area include the western burrowing owl, gilded flicker, American peregrine falcon, and golden eagle. Impacts on these species would not differ from those described in Section 4.5.2.4 for migratory birds, raptors, and eagles, including the potential for collisions with wind turbines that were described as small by Thompson et al. (2011b). The gilded flicker and burrowing owl didn't show any elevated risk for collisions (Thompson et al. 2011); therefore, gilded flicker and burrowing owl mortality over the life of the Project is projected to be very low. The peregrine falcon did not occur in the Project Area during baseline surveys, and it would be an extremely rare species if it were to; its potential for collision relative to the Project would likely be zero. Potential impacts on the golden eagle are discussed below.

Decommissioning

The impacts on BLM sensitive wildlife during the decommissioning period would be similar to those during the construction period.

Arizona Wildlife of Concern

Construction

The big free-tailed bat was documented in the Project Area. This is the only bat species in the Project Area that is categorized by AGFD as one of greatest conservation need and that has no other special status label. Impacts on this species are described in Section 4.5.2.4. This includes some potential for loss of roost sites that could occur in the mountains surrounding Squaw Peak in the northwestern corner of the Project Area.

Twenty birds listed as AGFD species of greatest conservation need were observed as part of baseline surveys in the Project Area. Five of those were priority species and included the golden eagle, Abert's towhee, burrowing owl, gilded flicker, and savannah sparrow. The golden eagle, burrowing owl, and prairie falcon were the only raptors among the species documented during baseline surveys for the Project. The ferruginous hawk also has been found about 10 to 15 miles east of the Project Area, based on HDMS inquiries for the Project (AGFD 2009b).

Direct impacts on these species would include loss or degradation of habitat, which would be minimal because 3 percent or less of the habitat within the Project Area for each of these species would be affected by ground disturbances. Nesting habitat and habitat for prey species of the burrowing owl could be removed by development of croesotebush desertscrub. Abert's towhee, the savannah sparrow, and gilded flicker could be impacted to a small degree by removal of vegetation, but these species were represented by single individuals during baseline surveys, and impacts would be inconsequential to minimal due to the likely extremely limited use of the Project Area. Because the majority of sensitive bird species appear to occur in relatively small numbers, and there is a large amount of habitat that would remain available within and adjacent to the Project Area (Thompson et al. 2011), sensitive bird species would have no or minimal impacts through habitat loss or degradation.

The banded Gila monster, an Arizona protected species, could be directly and indirectly affected by the Project. Impacts would be similar to those described for the desert tortoise; however, the direct loss of individuals could be less because this species spend most of their time underground in burrows (AGFD 2002). Direct long-term impacts from vehicle mortality could occur, as well as the long-term indirect impact from the potential loss or degradation of habitat. The long-term indirect impact on habitat includes about 21 acres of volcanic rocklands and bedrock cliffs and outcrops in mountainous terrain from the installation of wind turbines, and about 46 acres of other upland habitats in mountainous terrain that could be used by the banded Gila monster. Disturbance of habitat could result in long-term direct impacts from the loss of individual banded Gila monsters and burrows. Indirectly the loss of individuals, burrows, and habitat integrity could result in a minor long-term reduction in the total populations of banded Gila monsters in the Project Area. Preconstruction surveys could identify high-quality habitat areas for the species, thus allowing for avoidance of these areas and reducing long-term impacts on habitat. Gila monster found in these situations would be handled according to Nevada Department of Wildlife (NDW) guidelines for handling Gila monsters on construction projects (NDW 2007). Revegetation is also possible in Gila monster habitat, but re-creation of suitable rocky habitat would be limited.

The magnitude of impacts from construction intervals on the free-tailed bat depends upon the number of turbines constructed and the amount of bat foraging and roosting habitat lost due to construction of the Project. Impacts on bats from construction intervals would reduce the number of turbines constructed in the initial intervals and amount of foraging or roosting habitat lost or degraded. However, when all construction intervals are completed, the effects would be the same as constructing the Project in a single interval.

Constructing the Project in two or more intervals could reduce the total area avoided by birds or banded Gila monsters from increased human activity during a given construction period. However, because the entire Project would eventually be constructed, the overall effects would be similar to constructing the Project in a single interval. The magnitude of the potential impacts on most sensitive species would be dependent upon the density and location of infrastructure, which would not be altered if the Project were constructed in two or more intervals. Construction intervals could result in a temporal reduction in amount of ground disturbance and improve reclamation success if vegetation became established prior to disturbance during a future construction interval. This would allow the opportunity to adapt management strategies based on past success, which could improve the success of subsequent reclamation. Indirectly this could reduce the temporal loss or degradation of sensitive species habitat.

Operations and Maintenance

Long-term impacts on the big free-tailed bat during operations would not differ from those described in Section 4.5.2.4, including the potential for fatal interactions with wind turbines that were described as small for the collective bat species by Thompson et al. (2011b). These impacts are detailed within Section 4.5.2.4. The big free-tailed bat may have a slightly higher risk of fatality, because it feeds at heights that include the rotor swept area. However, because this species would be uncommon in the Project Area, the long-term impact would be minimal to moderate.

Of the 20 birds listed as AGFD species of greatest conservation need (with the exception of golden eagles), exposure risk and potential impacts on non-raptors would be considered small, as the majority of the species either occur in very low abundance in the Project Area or exhibit behavior that makes them less at risk of direct impacts (i.e., they spend very little if any time at rotor swept heights) (Thompson et al. 2011). The exposure risk of collisions to prairie falcons is considered to be very small based on baseline field surveys, and the Project would not be expected to significantly impact prairie falcon populations (Thompson et al. 2011). The exposure risk to the ferruginous hawk would be very small because this species is likely extremely rare in the region based on HDMS queries, and its exposure would be small, with most of its activities being near the ground (Bechard and Schmutz 1995). These and other impacts would be the same as those described in the subsections for migratory birds, raptors, and eagles. These impacts are described within Section 4.5.2.4 for migratory birds and raptors. Potential impacts on the golden eagle are discussed below in this section.

Direct and indirect impacts on banded Gila monster habitat from the possibility of noxious weed and invasive weed establishment would be similar to those described for the desert tortoise. However, there could be fewer direct long-term impacts on individual banded Gila monsters from vehicle caused mortality because of the greater amount of time spent in burrows.

Decommissioning

The impacts on bats, migratory birds, raptors, and banded Gila monsters during decommissioning would be similar to that during construction.

Golden Eagles

Construction

Direct impacts on golden eagles would occur during the construction process. Removal of vegetation would remove about 1,537 acres of foraging habitat in creosotebush desert scrub habitat in the short term. Revegetation would restore habitats on all but about 317 acres in the long term. This could reduce local foraging efficiency for golden eagles. However, the short-term loss would be only about 3 percent of the available foraging habitat in the Project Area and would be minor.

Indirect, short-term behavior-related impacts on golden eagles also could occur during construction of the Project. Vehicles traveling in the Project Area and noises from blasting and other construction actions could initiate alert or flight responses. In the long-term, golden eagles could habituate to the higher noise and activity levels, but the degree to which they would adapt is uncertain (Barber et al. 2010).

The magnitude of these impacts on golden eagles from construction intervals depends upon the number of turbines constructed, the amount of foraging and breeding habitat lost due to construction of the Project, and the turbines constructed in any given interval. If an interval includes all the turbine corridors near the best golden eagle foraging and breeding habitat, the effects may be similar to constructing the entire Project in a single interval. However, if some turbines within eagle foraging and breeding habitat are delayed to a later construction interval, there could be a temporal reduction in the number of turbines constructed and amount of foraging habitat that is lost or degraded during any given construction intervals.

Operations and Maintenance

During operations, potential impacts would occur to golden eagles that encounter turbines, which could be killed by rotating blades (Arnett et al. 2007). Observations indicate that raptor fatalities at wind farm sites are not a significant source of human caused mortality (Fielding et al. 2005, Arnett et al. 2007, de Lucas et al. 2008). Erickson et al. (2001) compiled mortality data for the United States and reported that only about 2.7 percent of avian turbine fatalities outside of California were raptors. Among those, only 54 golden eagle fatalities have been recorded outside of Altamont Pass, California (Pagel et al. 2011). Nest survey data and bird survey data for this Project indicate infrequent use by golden eagles in and near the Project Area with an associated small risk for mortality (Thompson 2011).

Only two of twelve potential nesting territories in the Project study area were considered occupied in 2011, based on the presence of adult golden eagles in the vicinity of nest sites (Thompson 2011). No successful golden eagle nests were documented in 2011 within 10 miles of the Project Area (Thompson 2011). Currently, there are no data to determine breeding trends in the survey region for the Project. However, baseline survey results in 2011 suggest the breeding potential of the species in the region is likely limited, which could be related to annual weather trends or prey population cycles in the region (Thompson 2011, BP Wind Energy 2011b). In 2012, AGFD conducted follow-up surveys to better understand the breeding locations and trends of golden eagles surrounding the Project Area. The results will provide the best known and available scientific information to be incorporated into the Eagle Conservation Plan (ECP)/Bird Conservation Strategy (BCS) for the Project. A total of 89 golden eagle nests were detected at an estimated 16 golden eagle breeding areas in the Project Area plus 10-mile-radius survey area. The Squaw Peak breeding area was the only breeding area documented within the Project Area and it contained an active nest (Tetra Tech 2012).

Based on 2011 golden eagle nest surveys, the distribution of potential golden eagle territories in the region showed that two possible, unoccupied territories were within 1.0 mile (1.6 km) of proposed turbine corridors (Thompson 2011). Other nests were from about 3.0 to 10.5 miles (4.8 to 16.9 km) from the nearest turbine corridor. The two likely occupied territories in 2011 were about 8.5 miles (13.7 km) south and 9.5 miles (15.3 km) west of the nearest proposed turbine corridors. During 2012 nest surveys, a total of 89 golden eagle nests were detected at an estimated 16 golden eagle breeding areas in the Project Area plus 10-mile-radius survey area (1 breeding area in Project Area, 15 outside of the Project Area) (TetraTech 2012a).

Based on the data available in 2011, Thompson et al. (2011b) concluded that potential exposure risk to turbine fatality to golden eagles in the Project Area was small based on the small numbers of observed eagles and the small proportion of flights within rotor swept heights. However, the authors stated that direct mortality due to turbine collisions to a few golden eagles is possible over the life of the Project. Based on raptor fatality estimates for the Project (Thompson et al. 2011 and TetraTech 2012a) and the proportion of golden eagles observed during baseline wildlife surveys, as stated in the ECP/BCS, the model conservatively estimates there could be up to 0.33 golden eagle fatalities per year if 283 turbines were constructed. Annual fatality rates corresponding to these conservative model estimates could result in up to 1.65 eagle golden eagle fatalities over a 5-year period and up to 9.9 fatalities over the anticipated 30-year life of the Project (TetraTech 2012a). The fatality estimates are conservative and the actual number of fatalities could vary from these projections.

Constructing the Project in two or more intervals would have similar effects. However fatality rate could be lower during the operation of initial intervals when fewer turbines would be operating. The Project would eventually construct all of the turbines. Once all of the turbines were constructed, the same number of turbines would present the same collision risk as constructing the Project in a single construction interval. The level of impact due to collision would be minor to moderate, and would depend on the number of eagles killed in the long-term life of the Project.

Post-construction monitoring will be necessary to quantify the actual turbine-related impacts on golden eagles from this Project. To date, turbine deaths do not seem to be a population level impact for golden eagles at most wind energy facilities in the country, but fatalities could increase as more facilities are constructed in the future (NWCC 2010). Among the known deaths from turbines, only 54 golden eagle fatalities have been recorded outside of Altamont Pass, California (Pagel et al. 2011).

Golden eagles also could be exposed to the direct impact of collision or strikes with other human-made objects in the Project Area. The met towers, above ground collector lines, substations, transmission lines, switchyard, and fences in the Project Area increase the risk of fatal collisions. Transmission lines would have conductor to ground spacing that would prevent electrocution; however, collector lines would be at distribution voltage levels and could be an electrocution risk. APLIC guidelines on the gen-tie transmission line and collector lines would be followed, which would minimize or eliminate this impact. The Project option of burying collector lines would eliminate the possibility of collision with the collector lines, but would have no effect on the potential for fatal collisions with other infrastructure. Overall this impact would be minimal.

The noise generated from operating turbines could impede local use of the Project Area (Barber et al. 2010). Available studies in the United States indicate that golden eagles are not displaced in operational wind farms (Johnson et al. 2000, Madders and Whitfield 2006). Therefore, this indirect impact is unlikely to affect golden eagles in the area. Noise and human disturbance during maintenance activities could initiate flight responses and disrupt normal behavior in the short-term; however, these incidents would be periodic and would minimally affect golden eagle behavior in the long-term operation of the facility.

BP Wind Energy has prepared an ECP/BCS that follows USFWS Eagle Conservation Plan guidance. The measures set forth in the ECP/BCS would help to avoid any mortality of golden eagles caused by the Project and ensure that eagle preservation or "no net loss" standards are met by applying compensatory mitigation and adaptive management to offset eagle fatalities. Details of the mitigation are outlined in the ECP/BCS and involve removal of wildlife carcasses from roadsides to offset eagle-vehicle collisions. The ECP/BCS will also contain a detailed description of the post-construction mortality monitoring protocol and an adaptive management strategy to address impacts and to ensure the correct level of mitigation. The ECP/BCS calls for 2 years of post-construction mortality monitoring after commercial operation with additional post-construction mortality monitoring occurring at 5-year intervals. The results of the monitoring would be compared against thresholds that are tied into an adaptive management strategy, including seasonal curtailment of specific turbines to minimize or mitigate impacts.

The ECP/BCS developed for the Project meets the requirements of the BLM Instructional Memorandum 2010-156, which provides direction for compliance under the Bald and Golden Eagle Protection Act (BGEPA). BP Wind Energy has voluntarily committed to working with USFWS and BLM, Reclamation, and Western to apply for an eagle take permit. The eagle take permit process will follow the Eagle Conservation Plan Guidance (USFWS 2013), which provides specific in-depth guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities. Based on these requirements, the ECP/BCS must be accepted by the USFWS. Appendix I contains USFWS's letter acknowledging consistency with the Draft Eagle Conservation Plan Guidelines. The ECP/BCS is summarized in Appendix C and will be appended to the POD, which will be a part of the ROD and ROW grant if the project is approved.

Decommissioning

The impacts on golden eagles during the decommissioning period would be similar to that of the construction period. The removal of turbines and the other support infrastructure would create additional areas that would reduce the quality and quantity of habitat for forage species until disturbed areas become vegetated after reclamation. Behavioral responses and reduced use of the facility could result from the increased noise and human disturbance during this period, which would be similar to the construction period.

4.5.3 Alternative B

4.5.3.1 Vegetation and Land Cover Types

Construction

Compared to Alternative A, Alternative B would reduce the direct impacts on vegetation resources by reducing the number or size of corridors and reducing the potential number of wind turbines at the northwestern, northeastern, and southern margins of the wind farm. The types of direct construction impacts on vegetation resources would be the same as Alternative A. There would be slightly fewer acres of vegetation removed but similar proportions of the same landcover and vegetation types would be disturbed (Table 4-12).

The potential magnitude for impacts on vegetation and landcover would be reduced slightly compared to Alternative A from all Project facilities. In the short-term, 1,234 acres would be disturbed with Alternative B (Table 4-12), which is about 303 fewer acres than with Alternative A. The long-term disturbance would reduce to about 261 acres (Table 4-12), which is about 56 acres less than Alternative A.

Operations and Maintenance

The impacts on vegetation during operations and maintenance would not differ from Alternative A.

Decommissioning

The impacts on vegetation during decommissioning would not differ from Alternative A.

Table 4-12 Potential Vegetation Impacts from Project Features, Alternative B

Project Feature	Vegetation or Land Cover Type	Short-term Disturbance (Acres)	Long-Term Disturbance (Acres)
Wind Turbines	Inter-Mountain Basins Big Sagebrush Shrubland	0	<1
	Inter-Mountain Basins Semi-Desert Shrub Steppe	0	0
	North American Warm Desert Bedrock Cliff and Outcrop	0	0
	North American Warm Desert Volcanic Rockland	2	0
	Mojave Mid-Elevation Mixed Desert Scrub	13	0
	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	409	12
	Turbine Totals	**424**	**13**
Two Short-term Laydown/Staging Areas	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	32	0
Two Substations	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	10	10
Transmission Line to Switchyard Interconnecting to Mead-Phoenix 500-kV line or Interconnecting to Liberty-Mead 345-kV line	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	35	<1
Road along transmission line (20 foot width)	Sonora-Mojave Creosotebush-White Bursage Desert Scrub	15	15
Switchyard for an interconnection to Liberty-Mead 345-kV line	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	11	8
Switchyard for an interconnection to Mead-Phoenix 500-kV line	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	18	10
Operations and Maintenance Building and associated facilities such as parking	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	5	5

Project Feature	Vegetation or Land Cover Type	Short-term Disturbance (Acres)	Long-Term Disturbance (Acres)
Improvements to Existing Roads, including collector line trenches and any utility or communication lines to the O&M building	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	38	0
Development of New Access Roads, including collector line, utility lines, communication lines, and crane paths	Undetermined	597	199
Short-term Met Towers (assumes 20 total, including potential pre-construction power curve testing short-term met towers, if required)	Undetermined	37	0
Long-term Met Towers (assumes up to 4)	Undetermined	6	<1
Total Disturbance (with 500-kV switchyard) [1]		**1,234**	**261**

SOURCES: USGS National Gap Analysis Program (Southwest ReGAP) 2004, BP Wind Energy 2011a (Acreages from Southwest ReGAP were not field verified)

[1] Totals may vary due to rounding

4.5.3.2 Noxious Weeds

Construction

The types of impacts from noxious weeds that would occur during construction would not differ between Alternatives A and B. However, the potential magnitude for impacts from noxious weeds and invasive plant species would be reduced slightly compared to Alternative A, with about 303 fewer acres subject to temporary ground disturbance than Alternative A. With fewer acres disturbed, the potential for establishment of noxious weeds would decrease under Alternative B in comparison to Alternative A.

Operations

The types of impacts from noxious weeds that would occur during operations would not differ between Alternative A and B. However, the potential magnitude for impacts from noxious weeds and invasive plant species would be reduced slightly compared to Alternative A. The long-term disturbance would reduce to about 261 acres, which is about 56 acres less than Alternative A. With fewer acres disturbed, the potential for establishment of noxious weeds would decrease under Alternative B in comparison to Alternative A.

Decommissioning

The types of impacts from noxious weeds that would occur during decommissioning would be the same as those occurring during construction.

4.5.3.3 Wildland Fire

Construction

The types of impacts from wildland fire that would occur during construction would not differ between Alternative A and B. However, the potential for impacts from wildland fire would decrease slightly compared to Alternative A, due to fewer acres being disturbed. The short-term disturbance acres would reduce to 1,234 acres, which is about 303 acres less than Alternative A.

Operations and Maintenance

The types of impacts from wildland fire that would occur during operations would not differ between Alternative A and B. However, the potential for impacts from wildland fire would decrease slightly compared to Alternative A, due to fewer disturbance acres. The long-term disturbance would reduce to about 261 acres, which is about 56 acres less than Alternative A. With fewer acres disturbed, the potential for wildland fire would decrease under Alternative B in comparison to Alternative A.

Decommissioning

The types of impacts from wildland fire that would occur during decommissioning would be the same as those occurring during construction.

4.5.3.4 Wildlife

Summary

For all types of wildlife (mammals, bats, big game, wild burros, migratory birds, raptors, upland game birds, reptiles, and amphibians), the direct and indirect impacts of Alternatives A and B would be similar. Therefore, impacts for all wildlife are summarized in the following paragraphs.

Construction

While the types of direct and indirect impacts on wildlife that would occur during construction would not differ between Alternatives A and B, the potential magnitude for impacts associated with ground disturbance and loss of habitat would be less with Alternative B. The area subject to temporary ground disturbance with Alternative B is estimated at 1,234 acres, which is about 303 acres less than Alternative A. The configuration of this Project boundary would largely avoid mountainous habitat in the northwestern part of the Project Area near Squaw Peak and rocky uplands in the northeastern part of the Project Area. Impacts on rock dwelling wildlife would be reduced or eliminated under Alternative B. Sensitive resources include cliff and crevice roost sites for bats and two unoccupied nest sites for golden eagles; and a potential use region for bats, small birds, falcons, and golden eagles.

Operations and Maintenance

The types of direct and indirect impacts on wildlife that could occur during operations would not differ between Alternatives A and B, but the magnitude of the effects would be less. The long-term disturbance area would be about 261 acres, which is about 56 acres less than with Alternative A.

For birds, bats, and raptors, the potential for fatal collisions with wind turbines also would decrease under Alternative B. The Project could accommodate a maximum of about 166 to 208 turbines depending on turbine size chosen under this alternative, which would be about 75 fewer than for Alternative A. Avoiding potential use areas for bats and birds near Squaw Peak and the northeastern part of the Project Area would further decrease the potential for turbine fatalities for these species groups compared to Alternative A.

The option of using light gray instead of the standard white colored turbines would not present an additional impact to birds, bats, or raptors.

Decommissioning

The types of impacts on wildlife that would occur during decommissioning would be the same as those occurring during construction for Alternative A.

4.5.3.5 Special Status Plants

Federally Listed Plants

There are no Federally listed plant species in the Project Area or surrounding vicinity. Therefore, there would be no direct or indirect impact on Federally listed plant species.

BLM Sensitive Plants and Protected Arizona Native Plants

Construction

The direct and indirect impacts on BLM sensitive plants and protected Arizona native plants that would occur during construction would not differ between Alternatives A and B. However, the potential magnitude for indirect impacts from ground disturbance would be reduced slightly compared to Alternative A. The short-term indirect impacts from disturbance to suitable habitat would be 1,234 acres, which is about 303 acres less than Alternative A. The configuration of the Project boundary under this alternative would also avoid potential habitat for the Las Vegas bear poppy and silver leaf sunray near Squaw Peak. The overall impact from disturbance would be slightly smaller than under Alternative A.

Operations and Maintenance

The direct and indirect impacts on BLM sensitive plants and protected Arizona native plants that would occur during operations would not differ between Alternative A and B. However, the potential magnitude for long-term indirect impacts from noxious weeds and invasive plant species to suitable habitat areas would be reduced slightly compared to Alternative A. The long-term impact from ground disturbance would reduce to about 261 acres, which is about 56 acres less than Alternative A. With fewer acres disturbed, the potential for establishment of noxious weeds would decrease under Alternative B in comparison to Alternative A.

Decommissioning

The direct and indirect impacts on BLM sensitive plants and protected Arizona native plants that would occur during decommissioning would be the same as those occurring during construction.

4.5.3.6 Special Status Wildlife

Federally Listed Wildlife

Construction

The types of impacts on the Sonoran desert tortoise that would occur during construction would not differ between Alternatives A and B. However, the potential magnitude for impacts from ground disturbance would be reduced compared to Alternative A. The long-term indirect impact from the potential loss or degradation of Category III habitat desert tortoise habitat would be approximately 380 acres, which is about 144 acres less than Alternative A.

Operations and Maintenance

The types of impacts on the Sonoran desert tortoise that would occur during operations would not differ between Alternatives A and B. However, the potential magnitude for long-term indirect impacts from noxious weeds and invasive plant species to suitable desert tortoise habitat areas would be reduced slightly compared to Alternative A. The long-term impact from ground disturbance would reduce to about 138 acres, which is about 52 acres less than Alternative A. With fewer acres disturbed, the potential for establishment of noxious weeds would decrease under Alternative B in comparison to Alternative A. Utilizing mitigation measures to avoid or reduce impacts would further reduce the impacts on this species.

Decommissioning

The types of impacts on the Sonoran desert tortoise that would occur during decommissioning would be the same as those that would occur during construction.

BLM Sensitive Wildlife

Construction

The types of direct and indirect impacts on BLM sensitive birds and bats that would occur during construction would not differ between Alternatives A and B. However, the potential magnitude for impacts from ground disturbance would be reduced slightly compared to Alternative A. The short-term disturbance area would be 1,234 acres, which is about 317 acres less than Alternative A.

The configuration of the Project boundary in Alternative B would largely avoid mountainous habitat in the northwestern part of the Project Area near Squaw Peak and rocky uplands in the northeastern part of the Project Area. Sensitive resources include cliff and crevice roost sites for bats and two nest sites for golden eagles, and potential risk areas for bats, small birds, falcons, and golden eagles. Impacts on BLM species of concern would be less than those under the Alternative A Project boundary configuration.

Operations and Maintenance

The types of direct and indirect impacts on BLM sensitive birds and bats that would occur during operations would not differ between Alternatives A and B. The long-term disturbance would occur to about 261 acres of habitat, which is about 56 acres less than Alternative A.

The potential for fatal interactions with wind turbines also would decrease under Alternative B. The Project would avoid potential risk areas in the northwestern and northeastern parts of the Project Area and could accommodate a maximum of 208 turbines, depending on the turbine size chosen, which is about 75 fewer turbines than under Alternative A.

Decommissioning

The types of direct and indirect impacts on BLM sensitive birds and bats that would occur during decommissioning would be the same as those occurring during construction.

Arizona Wildlife of Concern

Construction

The types of impacts on Arizona wildlife of concern (big free-tailed bat and 20 birds) that would occur during construction would not differ between Alternatives A and B. However, the potential magnitude for impacts from ground disturbance would be reduced slightly compared to Alternative A. The short-term disturbance area would be 1,234 acres, which is about 303 acres less than Alternative A. Also the configuration of the Project boundary in Alternative B would largely avoid mountainous habitat in the northwestern part of the Project Area near Squaw Peak and rocky uplands in the northeastern part of the Project Area, which are known risk areas for bats and birds and which would further decrease the impacts on these species.

The potential impact from surface disturbance to the Gila Monster habitat would decrease under Alternative B. Potential disturbance or loss of volcanic rocklands and bedrock cliffs and outcrops, and upland habitats would total about 41 acres under Alternative B and about 26 fewer acres than Alternative A. Avoiding rocky upland areas during the siting process could avoid this impact altogether.

Operations and Maintenance

The types of direct and indirect impacts on birds and bats of concern that would occur during operations would not differ between Alternatives A and B. However, the potential magnitude for impacts from ground disturbance would be reduced slightly compared to Alternative A. The long-term disturbance area would be about 261 acres, which is about 56 acres less than Alternative A. The potential for fatal interactions with wind turbines also would decrease under this alternative due to the Project configuration, which avoids potential risk areas for birds and bats in the northwestern and northeastern parts of the Project Area. The Project could accommodate maximum number of 208 turbines under this alternative, depending on the turbine size chosen, which would be about 75 fewer than under Alternative A.

Decommissioning

The types of direct and indirect impacts on sensitive birds, bats, and the Gila monster that would occur during decommissioning would be the same as those occurring during construction.

Golden Eagles

Construction

The types of direct and indirect impacts on golden eagles that would occur during construction would not differ between Alternatives A and B. However, the potential magnitude for impacts from ground disturbance would be reduced slightly compared to Alternative A. The short-term disturbance area would be 1,234 acres, which is about 303 fewer acres than Alternative A.

Operations and Maintenance

The types of direct and indirect impacts on golden eagles that would occur during operations would not differ between Alternatives A and B. However, the potential magnitude for impacts from ground disturbance would be reduced slightly compared to Alternative A. The long-term disturbance area would be about 261 acres, which is about 56 fewer acres than Alternative A.

The potential for fatal collisions with wind turbines also would decrease under this alternative. As described in the ECP/BCS, the models conservatively estimate that the number of golden eagle fatalities if 208 turbines were constructed could be up to 0.24 per year. Annual fatality rates corresponding to these conservative model estimates would result in 1.20 golden eagle fatalities over a 5-year period and 7.2 fatalities over the anticipated 30-year life of the Project (TetraTech 2012a). The 2012 surveys found one active golden eagle nest within the Project Area; therefore, Alternative B reduces the number of turbines in areas of potential risk and increases distances to turbines compared to Alternatives A and C. The configuration of the Project boundary in Alternative B would avoid the Squaw Peak golden eagle breeding area, and could accommodate a maximum of about 166 to 208 turbines, depending on the turbine size chosen, under Alternative B, which would be about 75 fewer than under Alternative A.

The option of using light gray instead of the standard white colored turbines would not present an additional impact to golden eagles.

Decommissioning

The types of direct and indirect impacts on golden eagles that would occur during decommissioning would be the same as those occurring during construction.

4.5.4 <u>Alternative C</u>

4.5.4.1 Vegetation and Land Cover Types

Compared to Alternative A, Alternative C would reduce indirect impacts vegetation resources by reducing the number or size of corridors and reducing the potential number of wind turbines at the northwestern, northeastern, and southern margins of the wind farm. The type of direct construction impacts on vegetation resources would be the same as Alternatives A and B. There would be slightly fewer acres and similar proportions of the same landcover and vegetation types being disturbed compared to Alternatives A and B (Table 4-13).

The potential impacts on vegetation and landcover would be reduced slightly compared to Alternative A from all Project facilities, but would differ little from Alternative B. The short-term disturbance area would be about 1,264 acres, which is about 273 acres less than Alternative A and 30 acres more than Alternative B. The long-term disturbance would be about 268 acres, which is about 48 acres less than Alternative A and 7 acres more than Alternative B.

Table 4-13 Potential Vegetation Impacts from Project Features, Alternative C

Project Feature	Vegetation or Land Cover Type	Short-term Disturbance (Acres)	Long-Term Disturbance (Acres)
Wind Turbines	Inter-Mountain Basins Big Sagebrush Shrubland	0	<1
	Inter-Mountain Basins Semi-Desert Shrub Steppe	0	0
	North American Warm Desert Bedrock Cliff and Outcrop	0	0
	North American Warm Desert Volcanic Rockland	2	0
	Mojave Mid-Elevation Mixed Desert Scrub	7	0
	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	415	12
	Turbine Totals	**424**	**13**
Two Short-term Laydown/Staging Areas	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	32	0
Two Substations	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	10	10
Transmission Line to Switchyard Interconnecting to Mead-Phoenix 500-kV line or Interconnecting to Liberty-Mead 345-kV line	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	35	<1
Road along transmission line (20 foot width)	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	15	15
Switchyard for an interconnection to Liberty-Mead 345-kV line	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	11	8
Switchyard for an interconnection to Mead-Phoenix 500-kV line	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	18	10
Operations and Maintenance Building and associated facilities such as parking	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	5	5
Improvements to Existing Roads, including collector line trenches and any utility or communication lines to the O&M building	Sonoran-Mojave Creosotebush-White Bursage Desert Scrub	42	0
Development of New Access Roads, including collector line, utility lines, communication lines, and crane paths	Undetermined	623	207
Short-term Met Towers (assumes 20 total, including potential pre-construction power curve testing short-term met towers, if required)	Undetermined	37	0
Long-term Met Towers (assumes up to 4)	Undetermined	6	<1
	Total Disturbance (with 500-kV switchyard) [1]	**1,264**	**269**

SOURCES: USGS National Gap Analysis Program (Southwest ReGAP) 2005, BP Wind Energy 2011a (Acreages from Southwest ReGAP were not field verified)

[1] Totals may vary due to rounding

4.5.4.2 Noxious Weeds

Construction

The types of direct and indirect impacts from noxious weeds that would occur during construction would not differ among the action alternatives. However, the potential magnitude for impacts from noxious weeds and invasive plant species would be reduced slightly compared to Alternative A, but would differ little from Alternative B. The short-term disturbance area would be about 1,264 acres, which is about 273 fewer acres than Alternative A and 30 acres more than Alternative B.

Operations and Maintenance

The types of direct and indirect impacts from noxious weeds that would occur during operations would not differ among the action alternatives, although the potential magnitude for impacts from noxious weeds and invasive plant species would differ. The long-term disturbance for Alternative C would be about 269 acres, which is about 48 fewer acres than Alternative A and 8 acres more than Alternative B.

Decommissioning

The types of direct and indirect impacts from noxious weeds that would occur during decommissioning would be the same as those occurring during construction.

4.5.4.3 Wildland Fire

Construction

The types of direct and indirect impacts from wildland fire that would occur during construction would not differ between Alternatives A, B, C, and E. However, the potential for impacts from wildland fire would decrease slightly compared to Alternative A, due to decreased disturbance, but would differ little from Alternative B. The short-term disturbance area for Alternative C would be about 1,264 acres, which is about 273 fewer acres than Alternative A and 30 acres more than Alternative B.

Operations and Maintenance

The types of direct and indirect impacts from wildland fire that would occur during operations would not differ among the action alternatives. Having a smaller ground disturbance area, the potential for impacts from wildland fire with Alternative C would decrease slightly compared to Alternative A, but would differ little from Alternative B. The long-term disturbance would be about 268 acres, which is about 48 fewer acres than Alternative A and 7 acres more than Alternative B.

Decommissioning

The types of direct and indirect impacts from wildland fire that would occur during decommissioning would be the same as those occurring during construction.

4.5.4.4 Wildlife

Summary

For all types of wildlife (mammals, bats, big game, wild burros, migratory birds, raptors, upland game birds, reptiles, and amphibians), the differences among Alternatives A, B, C, and E would be similar.

Construction

While the types of direct and indirect impacts on wildlife that would occur during construction would not differ among Alternatives A, B, C, and E, the potential magnitude for impacts associated with ground disturbance and loss of habitat would be the less than Alternative A. The area subject to short-term ground disturbance with Alternative C is estimated at 1,264 acres, which is about 273 acres less than Alternative A and 30 acres more than Alternative B. Like Alternative B, the configuration of the Project boundary under this alternative would also avoid the same potential risk and sensitive areas that are near Squaw Peak and in the northeastern part of the Alternative A Project boundary.

Operations and Maintenance

The types of direct and indirect impacts on wildlife that occur during operations would not differ from Alternatives A and B. The magnitude of the effects would be less with Alternative C than Alternative A and similar to Alternative B. The long-term disturbance area would be about 269 acres, which is about 48 fewer acres than Alternative A, and 7 acres more than Alternative B.

For birds, bats, and raptors, the potential for fatal collisions with wind turbines also would decrease compared to Alternative A and would be the same as Alternative B. The Project could accommodate a maximum of about 166 to 208 turbines depending on the turbine size chosen, under Alternative C, which is about 75 fewer than under Alternative A and the same number as Alternative B. Like Alternative B, Alternative C also would avoid the same potential risk and sensitive areas that are near Squaw Peak and in the northeastern part of the Alternative A Project boundary.

The option of using light gray instead of the standard white or light off-white colored turbines would not present an additional impact to birds, bats, or raptors. The impact would be the same as Alternative B.

Decommissioning

The types of direct and indirect impacts on wildlife that would occur during decommissioning would be the same as those occurring during construction for Alternative B.

4.5.4.5 Special Status Plants

Federally Listed Plants

There are no Federally listed plant species in the Project Area or surrounding vicinity. Therefore, there would be no direct or indirect impact to Federally listed plant species.

BLM Sensitive Plants and Protected Arizona Native Plants

Construction

The types of direct and indirect impacts on BLM sensitive plants and protected Arizona native plants that would occur during construction would not differ among Alternatives A, B, C, and E. However, with Alternative C, the potential magnitude for impacts from ground disturbance would be reduced slightly compared to Alternative A, but would differ little from Alternative B. The short-term disturbance area would be about 1,264 acres, which is about 273 fewer acres than Alternative A and 30 acres more than Alternative B. The configuration of the Project boundary under this alternative would also avoid the same potential habitat for the Las Vegas bear poppy and silverleaf sunray near Squaw Peak as in Alternative B. The overall disturbance impact would be slightly less for these groups of plant species under Alternative C.

Operations and Maintenance

The types of direct and indirect impacts on BLM sensitive plants and protected Arizona native plants that would occur during operations would not differ among Alternatives A, B, C, and E. However, the potential magnitude for impacts from ground disturbance with Alternative C would be reduced slightly compared to Alternative A, and would differ little from Alternative B. Alternative C would result in about

261 acres of long-term disturbance, which is about 48 fewer acres than Alternative A and 7 acres more than Alternative B.

Decommissioning

The types of direct and indirect impacts on BLM sensitive plants and protected Arizona native plants that would occur during decommissioning would be the same as those occurring during construction.

4.5.4.6 Special Status Wildlife

Federally Listed Wildlife

Construction

The types of direct and indirect impacts on the Sonoran desert tortoise that would occur during construction would not differ among Alternatives A, B, and C, and E. However, the potential loss or degradation of Category III habitat desert tortoise habitat would be approximately 412 acres. This would reduce compared to Alternative A (112 fewer acres), but be slightly higher compared to Alternative B (31 more acres).

Operations and Maintenance

The types of direct and indirect impacts on the Sonoran desert tortoise that would occur during operations would not differ among Alternatives A, B and C, and E. However, Alternative C would have less potential magnitude for impacts based on a ground disturbance than Alternative A and the effects would be similar to Alternative B. The long-term disturbance for Alternative C would be about 146 acres, which is about 44 acres less than Alternative A and 8 acres more than Alternative B.

Decommissioning

The types of direct and indirect impacts on the Sonoran desert tortoise that would occur during decommissioning would be the same as those occurring during construction.

BLM Sensitive Wildlife

Construction

The types of direct and indirect impacts on birds and bats that would occur during construction would not differ among Alternatives A, B, C, and E. However, the potential magnitude for impacts from ground disturbance would be reduced by 273 acres compared to Alternative A, and increased by 30 acres compared to Alternative B. Like Alternative B, the configuration of the Project boundary under this alternative would also avoid the same potential risk and sensitive areas that are near Squaw Peak and in the northeastern part of the Alternative A Project boundary. The overall disturbance impact would be slightly less for these species under Alternative C.

Operations and Maintenance

The types of direct and indirect impacts on birds and bats that would occur during operations would not differ among Alternatives A, B, C, and E. However, the potential magnitude for impacts from ground disturbance would be reduced slightly compared to Alternative A, but would differ little from Alternative B. The long-term disturbance for Alternative C would be about 268 acres, which is about 48 fewer acres than Alternative A and 7 acres more than Alternative B.

The potential for fatal interactions with wind turbines also would decrease under this alternative in comparison to Alternative A, but would be the same as Alternative B. Alternative C could accommodate a maximum of about 166 to 208 turbines, depending on the turbine size chosen, which is about 75 fewer than under Alternative A and the same number as Alternative B. Avoiding the same potential risk areas for birds and bats as in Alternative B would also reduce the potential for turbine fatalities. The overall impact would be slightly less for these species under Alternative C than Alternative A or B.

Decommissioning

The types of direct and indirect impacts on BLM sensitive wildlife that would occur during decommissioning would be the same as those occurring during construction.

Arizona Wildlife of Concern

Construction

The types of direct and indirect impacts on birds and bats would be the same as described above for BLM sensitive wildlife. The potential impact to habitat of the Gila Monster would be decreased under Alternative C compared to either Alternative A and B. Potential disturbance or loss of volcanic rocklands, bedrock cliff and outcrops, and upland habitat for this species could total about 36 acres under Alternative C compared to about 31 fewer acres than Alternative A and about 5 fewer acres than Alternative B. Avoiding rocky upland areas during the siting process could eliminate this impact altogether.

Operations and Maintenance

Impacts during operations and maintenance would be the same as described above for BLM sensitive wildlife.

Decommissioning

The types of direct and indirect impacts on Arizona wildlife of concern that would occur during decommissioning would be the same as those occurring during construction.

Golden Eagles

Impacts on golden eagles during construction, operations and maintenance, and decommissioning of the Project would be the same as described above for BLM sensitive wildlife under Alternative B.

4.5.5 Alternative D – No Action

Under the No Action Alternative, the Project would not be constructed. There would be no additional impacts on biological resources beyond those associated with the current uses of the Project Area.

4.5.6 Alternative E – Agencies' Preferred Alternative

Construction

For most biological resources, construction of Alternative E would have effects similar to those described for Alternatives A, B, and C. That is, other than differences in the extent of temporary and long-term ground disturbance (which is estimated at a maximum of 1,317 acres and 268 acres, respectively, for Alternative E), the effects on vegetation and land cover, noxious weeds, wildland fire, wildlife, special status plants and wildlife, sensitive wildlife, and most Arizona wildlife of concern species would be similar to the other action alternatives. The potential impacts on Gila monsters would be similar to Alternative B with about 42 acres of volcanic rocklands, bedrock cliff and outcrops, and upland habitats disturbed during construction. The mitigation measures also would be applied to Project construction, operations and maintenance, and decommissioning. The primary difference would be that Alternative E would have less impact on golden eagles, other raptors and bats due to the eagle nest avoidance area (see Maps 2-11, 2-12 and 2-13), the curtailment zone and phased construction as described in Section 2.6.6.

Recent surveys identified an active golden eagle nest in the northwest corner of the Wind Farm Site. BP Wind Energy, in coordination with USFWS, has prepared an ECP/BCS) in accordance with the USFWS Draft Eagle Conservation Plan Guidance for the development of Eagle Conservation Plans, and BLM IM 2010-156, which provides direction for compliance under the Bald and Golden Eagle Protection Act. The ECP/BCS summarizes the environmental conditions at the Project, avian studies conducted and their results, potential impacts to eagles and non-eagle bird species, avoidance and minimization elements, and compensatory mitigation for unavoidable impacts of the Mohave County Wind Farm. As a result of the coordination with USFWS, under Alternative E BP Wind Energy would agree to establish a 1.25-mile avoidance/no-build area encompassing the nest and forage area west of the active nest, and to establish a curtailed operation zone. The no-build area and curtailed operation zone are components of Alternative E (see avoidance area on Maps 2-11 to 2-13).

Through coordination among the USFWS, BLM, Reclamation, and AGFD, the combined 1.25-mile eagle nest avoidance area and surrounding curtailment zone was identified. In coordination with the USFWS, BLM, Reclamation, and AGFD to The curtailment zone extends about 1.5 miles east and about 3.3 miles south and southwest of the active nest (see Maps 2-11 to 2-13). When the golden eagle breeding area in the northwest portion of the Wind Farm Site is occupied, BP Wind Energy has agreed to shut turbines down daily from 11:00 a.m. to 4 p.m. between December 1 and March 15, and from 4 hours after sunrise until 2 hours before sunset between March 16 and August 31 or two months after the date any fledgling eagles leave the nest based on golden eagle activity patterns; this is expected to correspond to the approximate peak period of golden eagle flight activity in northeastern Arizona (Tetra Tech 2012a). Eagle use survey data would determine when curtailment can be concluded in any given breeding season after being triggered, the need to adjust the spatial extent of curtailment, and the effectiveness of the curtailment program; specific details are provided in the ECP/BCS, which is appended to the POD. At least three years of eagle use data would be collected prior to considering any relaxation of the spatial extent or proposed timing of curtailment within the existing curtailment zone. These curtailment requirements and no-build areas are expected to avoid and minimize impacts to eagles by reducing collision risk as well as by reducing the potential disturbance to eagles actively nesting in the Squaw Peak breeding area. The removal of turbines around the Squaw Peak golden eagle breeding area is expected to reducing the risk of collision compared to the remainder of the Project Area. In addition to these curtailment requirements, under Alternative E, construction of the turbines could be phased to meet either 425 MW or 500 MW nameplate generation capacity (see Map 2-11, 2-12 and 2-13). If this resulted in fewer turbines constructed within either the curtailment area or the southernmost turbine string the risk of collision and potential disturbance to golden eagles, other raptors, and bats could be reduced.

In a letter dated December 18, 2012, the USFWS acknowledged the ECP/BCS as “a comprehensive, objective, state-of-the-art document that conveys strong commitment to conservation of the golden eagle.” As noted in the letter from USFWS, the ECP/BCS would also benefit passerines and other bird species. The USFWS noted the extensive field efforts to evaluate potential risks to the species and gave credit to BP Wind Energy for “fully developing a novel approach to compensatory mitigation, in collaboration with the AGFD and the Service.” A copy of the acknowledgement letter is included in Appendix I of this Final EIS.

The no-build and curtailment zone in Alternative E would reduce construction in areas with sensitive resources. Sensitive resources include cliff and crevice roost sites for bats and two nest sites for golden eagles, and potential risk areas for bats, small birds, falcons, and golden eagles. The types of direct and indirect impacts on the Sonoran desert tortoise that would occur during construction would not differ among Alternatives A, B, and C, and E. However, the potential loss or degradation of Category III habitat desert tortoise habitat would be approximately 384 acres. This would including Category III habitat would be reduced slightly compared to Alternative A (140 fewer acres), and Alternative C (28 fewer acres) but be slightly higher compared to Alternative B (4 more acres). Impacts on Arizona species of concern and special status species would be less than those under the Alternative A, B, and C.

Operations and Maintenance

The no-build and curtailment zone in Alternative E would reduce operation and maintenance in areas with sensitive resources. Sensitive resources include cliff and crevice roost sites for bats and two nest sites for golden eagles, and potential risk areas for bats, small birds, falcons, and golden eagles. As described under impacts from construction, if fewer turbines were constructed to meet the required nameplate generation capacity, there could be less impact on golden eagles, other raptors, and bats due to the reduction in collision risk and disturbance.

The types of direct and indirect impacts on the Sonoran desert tortoise that would occur during operations would not differ among Alternatives A, B and C, and E. However, Alternative E would have the less potential magnitude for impacts based on a ground disturbance than Alternative A and the effects would be similar to Alternative B. Impacts on Arizona species of concern and special status species would be less than Alternative A, B, and C.

Decommissioning

The potential effects of Alternative E would be the same as those described under construction. Sensitive resources include cliff and crevice roost sites for bats and two nest sites for golden eagles, and potential risk areas for bats, small birds, falcons, and golden eagles and as there are fewer turbines constructed in these areas, thus less disturbance during decommissioning. The impacts on Arizona species of concern and special status species would be less than those under the Alternative A and similar to Alternatives B and C.

4.5.7 Mitigation Measures

BP Wind Energy would develop a number of plans and would follow BMPs and BLM regulations to mitigate impacts on biological resources. An Integrated Reclamation Plan has been developed with prescriptions to reduce the impacts from noxious weeds and invasive plant species. An Integrated Reclamation Plan would accompany the complete POD to improve the success of reclamation and lessen the impact of removal of native plant resources. The USFWS-accepted ECP/BCS and a Bat Conservation Strategy would aid in lessening impacts on bats, birds, and golden eagles. Implementation of noise mitigation measures as described in Section 4.15.7 would aid in lessening impacts to wildlife and other ecological resources. BP Wind Energy would adhere to the AGFD guidelines for desert tortoises during the life of the Project, which would lessen the Project-related impacts on this species. Biological mitigation measures follow:

Wildlife and Other Ecological Resources

- BP Wind Energy shall review existing information on species and habitats in the vicinity of the Project Area to identify potential concerns.
- BP Wind Energy shall conduct surveys for Federal and/or state-protected species and other species of concern (including special status plant and animal species) within the Project Area once the final disturbance areas are determined; BP Wind Energy shall design the Project to avoid (if possible) or minimize impacts on resources with special status.
- BP Wind Energy shall identify important, sensitive, or unique habitats in the vicinity of the Project and design the Project to avoid (if possible) or minimize impacts on these habitats

(e.g., locate the turbines, roads, and ancillary facilities in the least environmentally sensitive areas; i.e., away from riparian habitats, streams, wetlands, drainages, or critical wildlife habitats).

- BP Wind Energy shall evaluate avian and bat use of the Project Area and design the Project to minimize the potential for bird and bat strikes (e.g., development shall not occur in riparian habitats and wetlands). Scientifically rigorous avian and bat use surveys shall be conducted; the amount and extent of ecological baseline data required shall be determined on a project basis.
- Turbines shall be configured to avoid landscape features known to attract raptors, if site studies show that placing turbines there would pose a significant risk to raptors.
- BP Wind Energy shall determine the presence of bat colonies and avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies; in known migration corridors; or in known flight paths between colonies and feeding areas.
- BP Wind Energy shall determine the presence of active raptor nests (i.e., raptor nests used during the breeding season). Measures to reduce raptor use at the Project Area (e.g., minimize road cuts, maintain either no vegetation or non-attractive plant species around the turbines) shall be considered.
- Habitat restoration shall be included as part of the Integrated Reclamation Plan, to avoid (if possible) or minimize negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan will identify cacti and yucca plants to be avoided or transplanted. The plan shall identify revegetation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur as soon as possible after the sequence of ground disturbing construction activities in an area are completed in order to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
- Native plants that have been identified for transplanting as a result of ground disturbance activities will be transplanted during reclamation in a manner similar to natural vegetative spacing in the Project Area to the extent possible.
- Procedures shall be developed to avoid or lessen potential impacts on special status species. Such measures could include avoidance, relocation of Project facilities or lay-down areas, and/or relocation of biota.
- Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching.

Preparation and Project Design

- Where practicable, avoid and minimize potential impacts to important, sensitive, or unique habitat and biota in the Project Area.
- Avoid or minimize impacts on sensitive wildlife and their habitat during Project planning.

Vegetation/Habitat Impacts

- Micro-site turbines, collector lines, and roads to the extent possible within turbine corridors to avoid sensitive biological resources.
- Locate other Project facilities away from sensitive areas or habitats to avoid further impacts on sensitive biological resources.

- If BLM sensitive plants are identified within the limits of disturbance at any point during the life of the Project, BLM would be contacted prior to initiating the activity. If impacts to sensitive plants cannot be avoided, adaptive management strategies will be developed to minimize impacts, such as collect all seeds from the plant or transplant.
- Minimize the disturbance footprints and co-locate roads, collector lines, and other linear facilities to the extent possible to minimize disturbance to biological resources.
- Configure access roads and utility corridors to avoid high quality habitats and minimize habitat degradation and fragmentation.
- Minimize the number and extent of drainage crossings to limit impacts on high quality xeroriparian habitats.
- As described in the Integrated Reclamation Plan, implement vegetation, soil stabilization, and erosion prevention measures as soon as possible following construction of elements in the Project Area.
- Conserve and redistribute native topsoil and associated seed bank of rare plant species.
- Limit fugitive dust along roads and other disturbed areas by applying water to limit impacts on plants in adjacent areas.
- Where only temporary disturbances are necessary (e.g., for pull sites or temporary construction areas), mow or crush vegetation in favor of land clearing methods where root systems are damaged.
- Limit vehicle and foot traffic to areas within long-term and short-term disturbance sites.
- Develop and present an ecological awareness training program to Project personnel, construction contractors, and guests to the Project Area that discusses biological conservation measures, impact minimization, and acceptable BMPs.
- Employ wildland fire prevention measures including limiting vehicle travel to and within construction areas to only essential vehicles, establishing parking guidelines in remote areas, banning smoking and non-construction flame sources outside of vehicles, and establishing safety guidelines for construction flame and spark sources.

Wildlife Disturbance

- Complete two years of post-construction mortality monitoring for all birds and bats, complete and provide agencies with an annual report, and revisit at the end of the first two years of data collection to determine if any additional measures are needed. Avoid potential bat roost sites to the extent possible.
- Permanent met towers, transmission towers, and other facilities should be designed to discourage use by birds or other wildlife.
- Avoid the use of guy wires on met towers and other structures.
- Design of above ground transmission lines and collector lines would follow established APLIC guidelines to minimize collisions with birds and electrocution of raptors.
- Consider the use of bird flight diverter devices where deemed appropriate.
- Avoid night-lighting for facilities other than mandatory lighting on turbines to minimize attracting nocturnal migrant birds.

- Conduct vegetation clearing during the non-breeding bird season.
- If the bird breeding season cannot be avoided, conduct bird nest surveys in areas to be cleared and flag a non-disturbance area to avoid destroying active nests.
- Develop a ECP/BCS satisfying the requirements of the BLM Instructional Memorandum 2010-156, which provides direction for compliance under the Bald and Golden Eagle Protection Act (BGEPA). Based on these requirements, the ECP/BCS must be accepted by the USFWS. Appendix I contains USFWS's letter acknowledging consistency with the Draft Eagle Conservation Plan Guidelines. The ECP/BCS is summarized in Appendix C and will be appended to the POD, which will be a part of the ROD package and ROW grant if the Project is approved. Implement the site-specific mitigation measures identified in the ECP/BCS that were developed in coordination with USFWS, BLM, Reclamation, Western, and AGFD.
- Follow AGFD guidelines for monitoring and handling of desert tortoises on construction projects. Employ qualified/certified desert tortoise monitors during construction and demolition. Include desert tortoise education in the ecological awareness training.
- Employ BLM's *Strategy for Desert Tortoise Habitat Management on Public Lands in Arizona: New Guidance on Compensation for the Desert Tortoise* (Instruction Memorandum No. AZ-92-46) if the classification of desert tortoise habitat includes categories listed in the Programmatic Agreement. This would include implementation of the standard 100 percent avoidance for desert tortoise and their burrows, as outlined in AGFD guidelines.
- Avoid or minimize impacts on burrowing owls by following AGFD *Burrowing Owl Project Clearance Guidance for Landowners* (AGFD 2009b), to survey for burrowing owls and to institute the appropriate conservation measures for burrowing owls that occupy burrows in or near the construction footprint.
- Monitor or provide internal support (e.g., wadded paper) for tortoise burrows that collapse in blast areas. Inspect, remove and relocate on-site eggs and tortoises from burrows that would be destroyed by land clearing activities. Collapse burrows after removal of contents.
- Fill any trenches/holes immediately, or cover them at night and provide escape ramps every 147 feet (45 meters) when not in use. Escape ramps can be short lateral trenches or wooden planks sloping to the surface at an angle of 45 degrees or less to prevent entrapment of wildlife (AGFD 2008b).
- Trenches that have been left open overnight, or after rain events would be inspected, and animals removed prior to backfilling (AGFD 2008b).

Noxious Weeds and Invasive Plants

- Develop an Integrated Reclamation Plan to include noxious weed and invasive plant control in disturbed areas.
- BP Wind Energy shall conduct surveys for noxious weed and invasive plant species within the Project Area once the final disturbance areas are determined.
- Consistent with the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement*, only BLM-approved herbicides would be used.

- Develop and implement guidelines to clean and inspect vehicles in an established wash site to prevent propagating reproductive materials of invasive plants and noxious weeds from entering the Project Area.
- Limit access to Project Area to only construction and Project-related vehicles to limit establishing and spreading noxious weeds or invasive plants.
- Utilize fill materials from on-site sources to the extent possible to limit incursion of noxious weeds or invasive plants. Outside sources of fill material shall be from weed-free sources.
- Mulch material and seeds for reclamation shall be certified weed free.
- Use an integrated approach to manage infestations that includes scheduled surveys and reporting of any infestations along Project roads, disturbance zones, and Project facilities. Utilize chemical, mechanical, or biological methods of weed control to limit the spread of noxious weeds and invasive plants and tailor treatments to specific weeds on site.
- Pre-treat reclamation sites to limit germination of noxious weeds or invasive plants in disturbance areas.
- Limit herbicides to non-persistent, immobile types, and apply these in accordance with their application and permit directions and use in terrestrial or aquatic applications.

4.5.8 Unavoidable Adverse Impacts

Unavoidable adverse impacts on biological resources could occur from a number of sources through implementation of the Project. Ground clearing for Project infrastructure would eliminate vegetation resources and wildlife habitat in the short-term, although most would be reclaimed. Established BLM success criteria for reclamation would follow the defined criteria in the Integrated Reclamation Plan, which would be approved by BLM and Reclamation. This would help to reestablish ground cover that would be similar, but not necessarily identical, to the original vegetation and habitats.

Areas with sensitive plant and animal resources could be altered over a long-term period. Areas that cannot be avoided and are subsequently cleared and reclaimed may not restore the specific habitat components needed for these species. This could reduce the local populations of the silverleaf sunray, Las Vegas bear poppy, and Gila monster if present.

Other disturbances related to noise, vehicles traveling along roadways, and human activity could behaviorally displace or alter the natural behavior of wildlife. This could reduce the density of local populations of some species. This impact would be most pronounced during construction and decommissioning when human activity would peak in the Project Area.

The operation of wind turbines would unavoidably affect birds and bats by adding a source of mortality to the Project Area. Bird and raptor (including golden eagle) collisions and fatal bat interactions would increase local mortality of the affected species. Due to the small abundance of birds, including golden eagles and other raptors, and bats in the Project Area, mortality is not anticipated to be large enough to affect populations in the long-term. Based on existing data, fatalities of birds and bats associated with wind turbines do not seem to be a source of population decline at existing wind facilities but could be as more facilities are brought on-line in the future (NWCC 2010). Post-construction monitoring will be necessary to quantify the actual turbine-related impacts on these species from this Project.

4.6 CULTURAL RESOURCES

This section discusses potential impacts on cultural resources that could result from implementation of Alternative A, B, C, D or Alternative E, the Agencies' Preferred Alternative.

4.6.1 Analysis Methods

The assessment of potential effects on cultural resources was based on agency and tribal consultations, the cultural resource studies discussed in Section 3.6.1.3 (Class I overview of prior surveys, Class III pedestrian surveys, and a Hualapai ethnohistoric study conducted for the Project), and visual changes to cultural resources whose settings are an important aspect of their historical values (see Section 4.12). Public and agency scoping and consultation with Indian Tribes identified concerns about potential impacts on two general types of cultural resources, including:

1. Archaeological and historical resources (particularly prehistoric archaeological sites as well as historic sites related to mining, ranching, and transportation)
2. Traditional cultural resources that are significant to tribes because they are associated with cultural practices or beliefs, are rooted in their tribal histories, and are important in maintaining the continuing cultural identity of the tribes

Potential impacts of concern for cultural resources include not only direct impacts of turbine construction and development of access roads and other related facilities, but also indirect impacts resulting from soil erosion, increased vulnerability to disturbance and vandalism associated with enhanced access, and visual impacts stemming from the introduction of tall turbine towers into the rural setting of cultural resources in the Project vicinity. The area of analysis for potential impacts on cultural resources was the area of potential effects, as discussed in Section 3.6.1.2.

BLM determines the effect of projects on properties listed in or eligible for the National Register using criteria defined by regulations for Protection of Historic Properties (36 CFR 800), which implement Section 106 of the National Historic Preservation Act. Those regulations define an effect as a direct or indirect alteration to the characteristics of a historic property that qualify it for inclusion in the National Register. Possible effect determinations include no effect, no adverse effect, or adverse effect. Effects are adverse when the alterations diminish the integrity of a property's location, setting, design, materials, workmanship, feeling, or association. Examples of adverse effects include:

- Physical destruction, damage, or alteration of all or part of a property
- Removal of a property from its physical location
- Change of the character of the use of a property or of physical features in the setting of a property that contribute to its historic significance
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the significant historic features of a property (36 CFR §800.5.a.2)

Those criteria were used to assess the effects on each National Register-listed or eligible historic property, but because final designs have not been completed, it is not possible to determine if each of the eligible properties could be avoided by construction (as preferred). It is likely that at least one of the larger prehistoric sites would not be completely avoidable.

4.6.2 Alternative A – Proposed Action

4.6.2.1 Construction

Archaeological and Historical Resources

Nine prehistoric archaeological sites within the proposed Project Area were determined to be eligible for the National Register for their potential to yield important information (Criterion D) (Table 4-14) (Section 3.6.1.1). All nine sites are toolstone collecting and knapping locations on public land administered by BLM. The information potential of those sites could be affected by ground disturbing construction activity but would not be affected by visual impacts and they are not the types of sites that are likely to attract the attention of unauthorized collectors or vandals.

Two of those prehistoric archaeological sites, AZ F:3:25 and 26(ASM), are adjacent to segments of existing roads that would be used as access roads/electrical collector lines. Because the roads are unlikely to require substantial widening and those two sites are approximately 130 and 30 feet from existing roads, respectively, they probably can be avoided. The other seven prehistoric sites, AZ F:3:31 through 37(ASM), overlap proposed turbine corridors. Construction activities associated with installation of the turbines and access roads/electrical collector lines could disturb parts of those sites, but more detailed engineering designs are needed to determine specifically how each site could be affected. Six of those sites are relatively small (approximately 2 acres or less) and at least some of those are at the edges or ends of the turbine corridors and might be avoided by tower placement and construction activities, but site AZ F:3:31(ASM) covers about 20 acres and there is less potential for completely avoiding that site.

Studies would be conducted to recover and preserve information and artifacts from sites that cannot be avoided, which is expected to adequately mitigate adverse effects on those sites. BLM would ensure that avoided properties are monitored and protected throughout the life of the wind farm. Data recovery and monitoring procedures would be defined by a Historic Properties Treatment Plan (HPTP) prepared in accordance with the Section 106 Memorandum of Agreement (MOA) that BLM developed, in consultation with the State Historic Preservation Office, Federal agencies, tribes, and BP Wind Energy, to resolve adverse effects (refer to Appendix G).

Table 4-14 Potential Impacts on Archaeological and Historical Properties[1]

Site Number, Name		Affiliation, Age	Site Type	Features, Artifact Counts	Site Size	Impact
1	AZ F:3:25(ASM)	aboriginal	toolstone collecting and knapping	Features: 1 anvil stone (embedded boulder), Artifacts = 25	less than 0.1 acre	along Temple Bar Back Road, likely to be avoided
2	AZ F:3:26(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts: 37	0.1 acre	along Squaw Peak Road, likely to be avoided
3	AZ F:3:31(ASM)	aboriginal, Archaic	toolstone collecting and knapping	Features: 1 knapping station Artifacts: 3,000 (estimated)	20.0 acres	in turbine corridor, probable disturbance depending on tower and access road placement
4	AZ F:3:32(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts: 3,000 (estimated)	2.1 acres	in turbine corridor, possible disturbance depending on tower and access road placement
5	AZ F:3:33(ASM)	aboriginal	toolstone collecting and knapping	Features: 9 knapping stations Artifacts: 113	1.1 acres	in turbine corridor, possible disturbance depending on tower and access road placement
6	AZ F:3:34(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts: 7,000 (estimated)	1.5 acres	in turbine corridor, possible disturbance depending on tower and access road placement

	Site Number, Name	Affiliation, Age	Site Type	Features, Artifact Counts	Site Size	Impact
7	AZ F:3:35(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts: 2,000 (estimated)	0.7 acre	in turbine corridor, possible disturbance depending on tower and access road placement
8	AZ F:3:36(ASM)	aboriginal	toolstone collecting and knapping	Features: 5 knapping stations Artifacts: 199	0.8 acre	in turbine corridor, possible disturbance depending on tower and access road placement
9	AZ F:3:37(ASM)	aboriginal	toolstone collecting and knapping	Features: none Artifacts 8,000 (estimated)	2.3 acres	in turbine corridor, possible disturbance depending on tower and access road placement
10	AZ F:3:43(ASM) Stone's Ferry Road	Euro-American, late 19th century	historical road with campsites and artifacts	Features: 3 possible campsites Artifacts: scattered along the road	11.5 miles long, 0.1 mile surveyed	main access road would disturb a short segment of the road in a location without artifacts and features

NOTE: [1] All sites have been evaluated as eligible for the National Register under Criterion D for their potential to yield important information. Ongoing consultation could determine that these sites are eligible under additional criteria. The proposed treatment for sites that cannot be avoided is to conduct studies to recover and preserve artifacts and information, which is expected to adequately mitigate any adverse impacts.

The Stone's Ferry Road, AZ F:3:43(ASM), also was determined to be eligible for the National Register under Criterion D. Although the road appears never to have been graded, it continues to be used, mostly for ranching purposes. The proposed main access road from US 93 would cross Stone's Ferry Road but there are no historical artifacts or features at the crossing location. Disturbance of a short segment of the road at that location would not adversely affect the potential of the road to yield important information.

Traditional Cultural Resources and Other Cultural Resources Sensitive to Visual Impacts

As discussed in Section 3.6.4, BLM consulted 13 tribes regarding potential impacts on traditional cultural resources (see Section 5.2.2.3 for a list of tribes). Based on those consultations, a Hualapai ethnohistoric study (Bungart 2013), and the assessment of visual impacts on landscape character and scenic quality, BLM determined that Wi Knyimáya (Squaw Peak) and Wi Hla'a (Senator Mountain) within the ancestral territory occupied by the Hualapai Red Rock Band, would be adversely affected by visual impacts (Table 4-15). Visibility analysis indicated that two other traditional cultural resources (Gold Strike Canyon-Sugarloaf Mountain and Mat Kwata [Red Lake]) would not be affected because the Project would not be visible from those locations (see Section 4.12).

Table 4-15 Potential Impacts on Traditional Cultural Resources[1]

	Site Name/	Description	Distance	Impact
1	Wi Knyimáya (Squaw Peak)	mountain peak, burial location, traditional Hualapai cultural resource	in right-of-way	adverse visual impact
2	Wi Hla'a (Senator Mountain)	mountain peak, burial location, traditional Hualapai cultural resource	1.5 miles	adverse visual impact
3	Gold Strike Canyon-Sugarloaf Mountain	traditional cultural property significant to Southern Paiute, Hualapai, Mojave, Yavapai, Hopi, Navajo, and Zuni; listed in National Register in 2004	16 miles	none (Project not visible)
4	Mat Kwata (Red Lake)	ephemeral playa traditionally used by the Hualapai	17 miles	none (Project not visible)

NOTES: [1] Strategies to mitigate adverse effects on traditional cultural resources eligible under Criteria A, B, and D would seek to preserve their significance under those criteria. Proposed mitigation would include developing educational programs, curriculum materials, or public outreach programs to preserve information about traditional Hualapai culture. BLM also would work to maintain access for the Hualapai and other tribes to places of traditional cultural significance.

Photo simulations were prepared for (1) Wi Knyimáya (Squaw Peak, Key Observation Point [KOP] 173), which is within the proposed Project Area; and (2) Wi Hla'a (Senator Mountain, KOP 169), a peak about

1.5 miles east of the proposed Project Area [see Section 4.12 and Appendix D-8, Figures D-8(a) and (b) and D-10(a) and (b)]. (A photo simulation also was prepared for a proxy locations for a place where the Hualapai traditionally collected salty earth, known as Mata Thi:ja (KOP 171), but the specific location could not be confirmed [see Appendix Figures D 9(a) and (b)].)

Numerous turbines would be visible in all directions from Wi Knyimáya (Squaw Peak) in foreground-middleground and background views (see photo simulation in Appendix D). Simulations indicate that a broad expanse of turbines also would be visible in foreground-middleground and background views from an elevated position on Wi Hla'a (Senator Mountain) with no topographic or vegetation screening (see photo simulation in Appendix D). Other than a communications tower and associated facilities constructed on the top of Wi Hla'a (Senator Mountain), man-made features visible to the west are limited to Squaw Peak Road and the Liberty-Mead and Mead-Phoenix transmission lines. In summary, the proximity and size of the turbines and motion of the blades would substantially change the character of the landscape views from both places. Flashing red hazard lights used to warn aviators of obstructions would demand attention in night time views from both locations. Although such changes are compatible with the BLM Class IV visual resource management objectives for the area, which allow major modifications that may dominate the landscape character, the impact on Wi Knyimáya (Squaw Peak) and Wi Hla'a (Senator Mountain) is considered adverse, but would not degrade their integrity so severely that they would no longer be considered eligible for the National Register. The visual impacts would be largely reversible with decommissioning of the Project.

In addition to the traditional cultural resources, eight other cultural resources sensitive to potential visual impacts were identified within 20 miles of the Project Area (Table 4-16). Visibility analysis indicates that three of those resources (Petroglyph Wash, Willow Beach Gauging Station, and Hoover Dam) would not be affected because the Project would not be visible from those locations.

Table 4-16 Other Cultural Resources Sensitive to Visual Impacts[1]

	Site Name/Number	Description	Distance from Project Area	Impact
1	Historic White Hills townsite	site of silver mining community, circa 1892 to 1902, few remnants left, cemetery on public land	2 miles	no effect on information potential
2	Black Mountains Ecosystem Management ACEC	desert bighorn sheep habitat and wild burro management area, numerous archaeological sites, such as rock shelters (including Bighorn Cave), campsites, pictographs, and mining cabins	5 miles	no effect on information potential of archaeological sites
3	Temple Bar Mission 66 Facilities	example of mid-twentieth-century National Park Service program to upgrade facilities	7 miles	weak to moderate visual contrast, night time lighting more noticeable
4	Petroglyph Wash	concentration of petroglyphs in canyon of Colorado River tributary	10 miles	none (Project not visible)
5	Joshua Tree-Grand Wash Cliffs ACEC	densest stand of Joshua trees in Arizona and 10 miles of scenic 2,000-foot-high cliffs, numerous archaeological sites (many with roasting pits)	12 miles	no effect on information potential of archaeological sites
6	Willow Beach Gauging Station, listed in National Register	built in 1934-1935 and operated until 1939 to measure river flows below Hoover Dam, listed in National Register in 1986	12 miles	none (Project not visible)
7	Old Spanish National Historic Trail	trail used between Mexican settlements in northern New Mexico and southern California, circa 1829 to 1840s	16 miles	weak visual contrast (closest segment beneath Lake Mead)
8	Hoover Dam National Historic Landmark	massive concrete arch-gravity dam built between 1931 and 1936; designated a National Historic Landmark in 1985	17 miles	none (Project not visible)

NOTES: [1] None of the impacts are considered adverse and no treatment is proposed.
ACEC = Area of Critical Environmental Concern

The historic White Hills townsite is on private land about 2 miles south of the Project Area and would not be directly affected. The former mining town has deteriorated into an archaeological site. An associated cemetery is west of the town on public land administered by BLM. A visual simulation was not prepared for this location, but terrain analysis indicates that the hubs of several turbines would be visible from the cemetery and the blade arcs above the hubs of several additional turbines would be seen in a middleground setting. Although visual contrast in the setting of the cemetery would be moderate to strong, the viewshed of the cemetery has been altered by improvement and pavement of the nearby White Hills Road (County Highway 145) and the removal of the buildings from the historic town with which it was associated. The visual impacts of the proposed Project would not affect the potential of the townsite and cemetery to yield important information.

The Temple Bar Mission 66 facilities are about 7 miles north of the Project Area. Photo simulations from a visitor kiosk at Temple Bar (KOP 7) indicate all or part of perhaps as many as 20 turbines would be visible in background views [refer to appended Figures D-4(a), 4(b), and 4(c)]. The Mission 66 buildings are at a somewhat lower elevation, and terrain would screen most views of the towers from those facilities. Night time aviation obstruction lighting could attract viewer attention. The visual impacts of the proposed Project on the setting of the Temple Bar Mission 66 facilities would result in weak to moderate contrast and is not considered adverse.

The Joshua Tree-Grand Wash Cliffs Area of Critical Environmental Concern (ACEC) is about 12 miles east of the Project Area. A visual simulation from a residence along Pierce Ferry Road just west of the ACEC indicates that topography would screen views of the Project and result in low visual contrast. The north end of the Black Mountains Ecosystem Management ACEC is approximately 5 miles southwest of the Project Area, and the Project would not be visible from most of the ACEC. The visual impacts of the proposed Project on the archaeological sites within the ACECs would not affect their potential to yield important information.

The segment of the Old Spanish National Historic Trail closest to the Project Area is inundated by Lake Mead within the Lake Mead NRA. The trail route on the north side of Lake Mead, as designated by the National Park Service (NPS) based on historic sources, is about 16 miles from the Project Area. No physical remnants of the trail have been identified at that location. The proposed Project would result in weak visual contrasts in the setting of that segment of the Old Spanish Trail, which is dominated by Lake Mead, and is not considered an adverse impact.

Alternative A would use white or off-white turbines that are provided by turbine manufacturers, as opposed to Alternatives B and C, which include options for painting turbines light gray, and Alternative E, which would stipulates a light gray color. From some vantage points, the white turbines could be perceived as being more visible than turbines painted light gray.

Alternative A, like Alternatives B and C, also could include a combination of buried and aboveground collector lines rather than installing all collector lines underground. This could result in more visual impacts, but impacts of aboveground lines are expected to be a relatively minor increment within the context of the much taller turbines. The extent of ground disturbance would be similar for either option and therefore direct construction impacts would be similar.

Building the Project in two or more construction intervals to coincide with securing power purchase agreements would have no change in effects on cultural resources compared to building the Project in a single interval. The area of potential ground disturbance and the locations of Project features would be the same, so the effects would not differ.

4.6.2.2 Operations and Maintenance

Ground disturbing activities associated with operations and maintenance of Alternative A are likely to be confined to areas that were disturbed during construction of the Project are not expected to introduce any additional visual changes to the landscape.

4.6.2.3 Decommissioning

Decommissioning is not expected to disturb areas that were not disturbed by construction of the Project. Removal of the turbines and other facilities would eliminate most of the visual impacts of the Project.

4.6.3 Alternative B

4.6.3.1 Construction

Archaeological and Historical Resources

Compared to Alternative A, Alternative B would reduce visual and noise impacts primarily on the Lake Mead NRA and secondarily on adjacent private property by eliminating 6 turbine corridors and parts of 8 other corridors at the northwestern, eastern, and southern margins of the wind farm (see Maps 2-2 through 2-7). The number of turbines would be reduced depending on which turbine model is used (refer to Table 2-6). No specific cultural resources sensitive to visual and noise impacts have been identified in those areas adjacent to the boundaries of the Lake Mead NRA and private lands. The direct construction impacts on cultural resources would be very similar to Alternative A because the nine prehistoric archaeological sites and one historical road evaluated as eligible for the National Register are not in the eliminated areas and would be subject to the same types of potential disturbance.

Traditional Cultural Resources and Other Cultural Resources Sensitive to Visual Impacts

Alternative B could eliminate approximately 15 to 20 turbines within 3 miles of Wi Knyimáya (Squaw Peak), depending on which turbine model is selected, including all those to the west of the peak and some to the northeast. An estimated 10 or fewer additional turbines would be eliminated between 3 and 5 miles. Alternative B would eliminate approximately 5 or fewer turbines within 1 to 3 miles of Wi Hla'a (Senator Mountain); including those closest to the mountain (none are within 1 mile). An estimated 5 or fewer additional turbines would be eliminated within 3 to 5 miles of the mountain. Many of the approximately 150 to 200 turbines throughout much of the wind farm would still be visible from Wi Knyimáya (Squaw Peak) and Wi Hla'a (Senator Mountain) and visual contrast would remain strong. The impacts of Alternative B on Wi Knyimáya (Squaw Peak), Wi Hla'a (Senator Mountain), and other cultural resources sensitive to visual impacts would be somewhat less than the proposed Project but the effect would still be adverse.

In contrast to the proposed Project, Alternative B includes the option of painting the turbines light gray, which might decrease their visibility from some vantage points but is not expected to eliminate the adverse impact.

4.6.3.2 Operations and Maintenance

Like Alternative A, activities associated with the operations and maintenance of Alternative B are not expected to result in any additional impacts on cultural resources.

4.6.3.3 Decommissioning

Like Alternative A, decommissioning of the Alternative B is not expected to result in any additional impacts on cultural resources.

4.6.4 Alternative C

4.6.4.1 Construction

Archaeological and Historical Resources

Compared to Alternative A, Alternative C would reduce visual and noise impacts on adjacent private property by eliminating 6 turbine corridors and parts of 8 other corridors at the northwestern, eastern, and southern margins of the wind farm (see Maps 2-2 through 2-4 and Maps 2-8 through 2-10). The number of turbines would be reduced depending on which turbine model is used (refer to Table 2-6). No specific cultural resources sensitive to visual and noise impacts have been identified in those areas adjacent to the boundaries of the private land and Lake Mead NRA. The direct construction impacts on cultural resources would be very similar to Alternative A because the nine prehistoric archaeological sites and one historical road evaluated as eligible for the National Register are not in the eliminated areas and would be subject to the same types of potential disturbance.

Traditional Cultural Resources and Other Cultural Resources Sensitive to Visual Impacts

Alternative C would reduce the number of turbines in the vicinity of Wi Knyimáya (Squaw Peak) to a similar extent as Alternative B. Alternative C would reduce the number of turbines within 1 to 3 miles of Wi Hla'a (Senator Mountain) by approximately 10 or fewer (none are within 1 mile), compared to 5 or fewer for Alternative B. Alternative C would eliminate approximately 5 or fewer additional turbines within 3 to 5 miles of Wi Hla'a (Senator Mountain), which would be the same as Alternative B. Many of the approximately 150 to 200 turbines throughout much of the wind farm would still be visible from Wi Knyimáya (Squaw Peak) and Wi Hla'a (Senator Mountain) and visual contrast would remain strong. Like Alternative B, the impacts of Alternative C on Wi Knyimáya (Squaw Peak), Wi Hla'a (Senator Mountain), and other cultural resources sensitive to visual impacts would be somewhat less than the proposed Project but the effect would still be adverse.

Alternative C includes the option of painting the turbines light gray, which might decrease their visibility from some vantage points.

4.6.4.2 Operations and Maintenance

Like Alternatives A and B, activities associated with the operations and maintenance of Alternative C are not expected to result in any additional impacts on cultural resources.

4.6.4.3 Decommissioning

Like Alternatives A and B, decommissioning of Alternative C is not expected to result in any additional impacts on cultural resources.

4.6.5 Alternative D – No Action

Under Alternative D, development of the Project would not be pursued. Cultural resources would not be affected by the Project, but would continue to be subject to impacts of ongoing land uses and any modification of those uses approved in the future.

4.6.6 Alternative E – Agencies' Preferred Alternative

4.6.6.1 Construction

Archaeological and Historical Resources

Alternative E would eliminate turbine corridors within an eagle nest avoidance/ no-build area in the northwestern part of the proposed Wind Farm Site. Some other turbines would not be built in an adjacent area unless they are needed to meet the required nameplate generation capacity, and if built, operations of turbines within that zone would be curtailed during the eagle breeding season. Other turbines in the northeastern part of the Project Area would be eliminated, and construction of turbines in the southernmost corridor would be allowed only if needed to meet the required generation capacity. One of the prehistoric archaeological sites, AZ F:3:31(ASM) is in the curtailment area but could still be disturbed by turbine and access road/electrical collector line construction.

Traditional Cultural Resources and Other Cultural Resources Sensitive to Visual Impacts

Wi Knyimáya (Squaw Peak) is in the eagle nest avoidance area and turbines to the north and west of the mountain would be eliminated. Operation of other turbines near Wi Knyimáya (Squaw Peak) would be curtailed during the eagle breeding season, but many turbines would still be visible from the mountain. The impacts of Alternative E on Wi Knyimáya (Squaw Peak), Wi Hla'a (Senator Mountain), and other cultural resources sensitive to visual impacts would be somewhat less than the proposed Project and similar to those for Alternatives B and C but would further reduce the number of turbines near Wi Knyimáya (Squaw Peak) but eliminate fewer turbines near Wi Hla'a (Senator Mountain).

4.6.6.2 Operations and Maintenance

Like Alternatives A, B, and C, activities associated with the operations and maintenance of Alternative E are not expected to result in any additional impacts on cultural resources.

4.6.6.3 Decommissioning

Like Alternatives A, B, and C, decommissioning of Alternative E is not expected to result in any additional impacts on cultural resources.

4.6.7 Mitigation Measures

Section 106 consultations resulted in a determination of adverse effect for the proposed undertaking, as defined by regulations for Protection of Historic Properties (36 CFR Part 800), which implement Section 106 of the National Historic Preservation Act. In accordance with 36 CFR 800.6, BLM developed, in consultation with the State Historic Preservation Office, Federal agencies, tribes, and BP Wind Energy, a MOA to resolve potential adverse effects to historic properties (see Appendix G). The MOA stipulates that a HPTP will be developed to resolve adverse effects on historic properties listed in or eligible for the National Register. The MOA also defines review procedures and other responsibilities of the consulting parties, as well as legal and professional standards that will be followed in implementing the HPTP.

The primary strategy of the HPTP will be to avoid direct construction impacts on historic properties, but the HPTP will include procedures for recovering and preserving artifacts and information from any archaeological sites that cannot be avoided. That component of the HPTP cannot be completed until final design is undertaken and identifies which sites, if any, cannot be avoided. Final design will not be initiated until a ROD is issued authorizing development of an action alternative. Other components of the HPTP will include conducting supplemental surveys if final designs include Project facilities outside the areas that were surveyed for cultural resources during preparation of this EIS, as well as monitoring to ensure that avoided sites are not damaged and to check for vandalism or erosional damage to sites in the Project Area. The HPTP also will include a plan for protecting any unrecorded cultural resources that might be discovered during construction, operation, or decommissioning of the Project, and evaluating and treating such discoveries. The HPTP also will define procedures for training workers to protect cultural resources during construction, operation, and decommissioning of the Project and to report any discoveries that might be made. Based on recommendations of the Hualapai Tribe, a component of the HPTP will address adverse visual effects on Wi Knyimáya (Squaw Peak) and Wi Hla'a (Senator Mountain) through development of educational programs, curriculum materials, or public outreach designed to preserve information about the traditional cultural importance of the area for the Hualapai Tribe and to reinforce the Tribe's continuing cultural connections to the area.

The HPTP would be the major component of a Cultural Resource Management Plan (CRMP) that will be prepared in accordance with guidance of the BLM *Programmatic Environmental Impact Statement on Wind Energy*. Other components of the CRMP would include a Plan of Action to address any unanticipated discoveries of human remains, funerary objects, sacred objects, and objects of cultural patrimony in compliance with the Native American Graves Protection and Repatriation Act. Other elements of the CRMP could include measures to ensure continued access for traditional religious purposes or resource collection by tribes, and may include other measures for mitigating impacts on elements of the cultural environment that are not historic properties.

4.6.8 Unavoidable Adverse Impacts

As final designs are prepared, consideration would be given to avoiding construction impacts on the National Register eligible archaeological sites where feasible to do so. Preliminary engineering indicates that two of the nine identified National Register eligible sites very likely can be avoided, and it may be possible to avoid some of the other seven sites. Disturbance of significant archaeological sites that cannot be avoided by construction activities, as well as diminishment of traditional cultural resources due to visual or noise impacts would be an unavoidable adverse impact.

4.7 PALEONTOLOGICAL RESOURCES

4.7.1 Analysis Methods

Analytical methods include a paleontological records search through the Arizona Museum of Natural History (AzMNH) and a search of pertinent geologic and paleontological literature. Geologic maps of the area were consulted. No pedestrian survey of the area was undertaken. The area of analysis for potential impacts on paleontological resources was the Project Area.

4.7.2 Alternative A – Proposed Action

4.7.2.1 Construction

The paleontological records search (McCord 2010) concluded that no paleontological localities are known within the Project Area or within 10 miles of the Project Area boundaries. However, this absence of evidence must not be equated with a known absence of paleontological resources. A search of pertinent geologic literature yielded no mention of paleontological resources in the Project Area. Within the Project Area are some geologic deposits of a type that could produce paleontological resources. There are 15 known paleontological localities within Mohave County. Geologic mapping (Wilson and Moore 1959; URS 2010a) indicates that Quaternary sands and gravels cover much of the Project Area. Similar deposits have produced significant paleontological resources in other parts of Arizona. Thus, those within the Project Area are judged to have a potential to produce significant paleontological resources. In the Potential Fossil Yield Classification (PFYC) system, the sediments should be classified as 3b – Unknown Potential. Alternative A contains more square miles of Quaternary sediments than the other alternatives. Construction of roads, digging of foundations, and trenching for buried power lines could result in disturbance or degradation of paleontological resources. These effects would be reduced through a monitoring and mitigation program.

Constructing the Project in two or more intervals based on secured power purchase agreements would not require any additional ROW, access roads, or new permanent features. Therefore the effects from construction intervals would not change the effects on paleontological resources.

4.7.2.2 Operations and Maintenance

No effects on paleontological resources would occur during operations and maintenance for any of the action alternatives because no ground disturbing activities would be expected.

4.7.2.3 Decommissioning

While removal of Project features in decommissioning would include ground disturbing activities, the disturbance would be expected to affect the same areas those affected during construction. Therefore, no effects on paleontological resources would be expected with any of the action alternatives. However, should suspected paleontological resources be identified during decommissioning activities, work at that location would be stopped until a qualified paleontologist evaluates the site and BLM or Reclamation give clearance to proceed with decommissioning activities in that location.

4.7.3 Alternative B

Under Alternative B there would be fewer square miles of the Quaternary sand and gravel deposits in the Project Area than in Alternatives A and C. However, construction of roads, digging of foundations, and trenching for buried collector lines could disturb or degrade paleontological resources, but to a lesser degree than in Alternatives A and C because of the smaller disturbance area. These effects would be reduced through a monitoring and mitigation program.

4.7.4 Alternative C

Quaternary sands and gravels also occur in much of the area that would be affected under Alternative C. This alternative contains fewer square miles of these deposits than in Alternative A, but more than Alternative B. Construction of roads, digging of foundations, and trenching for buried collector lines could adversely affect paleontological resources, but to a lesser degree than in Alternative A and to a greater degree than Alternative B. These effects would be reduced through a monitoring and mitigation program.

4.7.5 Alternative D – No Action

No impacts on paleontological resources would occur under Alternative D.

4.7.6 Alternative E – Agencies' Preferred Alternative

4.7.6.1 Construction

Construction activities included in Alternative E are expected to impact paleontological resources in manners similar to those described for Alternatives A, B, and C because the Quaternary sands and gravels cover much of the Project Area. The temporary and long-term disturbance may be less if the nameplate generation capacity can be met without disturbing some of the areas with the construction of fewer turbines (see Section 2.6.6., Maps 2-11, 2-12 and 2-13). The reduction in temporary and long-term surface disturbance would be relative to fewer turbines being constructed.

4.7.6.2 Operations and Maintenance

No effects on paleontological resources would occur during operations and maintenance for any of the action alternatives because no ground disturbing activities would be expected.

4.7.6.3 Decommissioning

While removal of Project features during decommissioning would include ground disturbing activities, the disturbance would be expected to affect the same areas as during construction. Therefore, no effects on paleontological resources would be expected with any of the action alternatives. However, should suspected paleontological resources be identified during decommissioning activities, work at that location would be stopped until a qualified paleontologist evaluates the site and BLM or Reclamation give clearance to proceed with decommissioning activities in that location.

4.7.7 Mitigation Measures

If an action alternative is approved, BP Wind Energy would comply with the applicable Federal, state, and local laws, regulations, and policies identified in Table 1-2 pertaining to paleontological resources. In addition, the following actions are required:

- Before any construction takes place, qualified paleontologists would undertake a pedestrian survey for paleontological resources of the Tertiary and Quaternary sediments within the Project.
- Construction monitoring by a qualified paleontologist would take place in areas determined to be sensitive (if such areas are present) based on a pre-construction survey. In addition, a plan will be developed to address next steps in the event that sites are discovered during construction.
- A paleontological monitoring plan would be formulated by a qualified paleontologist after the preconstruction survey. The plan would conform to the standards of the Society of Vertebrate Paleontology (SVP 1995, 1996).
- A worker environmental appreciation program for construction personnel would be developed and presented to construction personnel regarding the appearance of possible paleontological resources in the area and procedures to be followed if suspected paleontological resources are encountered.
- Paleontological resources collected during monitoring activities must be stabilized, prepared to the point of identification, and curated in a museum with a permanent paleontological collection.
- A final report would be generated for all monitoring activities to summarize the results of the monitoring efforts, including a list and description of any resources found, and outlining the context and condition of these resources. This report would be submitted to the BLM and/or Reclamation depending on the locations of findings. The final report, maps of the localities and field notes must accompany any collected specimens.

4.7.8 Unavoidable Adverse Impacts

With monitoring and the application of the other mitigation measures, no unavoidable adverse impacts are anticipated from Project construction. However, there is potential for unavoidable adverse impacts should equipment cut through intact paleontological resources or if blasting is required and disturbs previously unidentified resources.

4.8 LAND USE

This section discusses the potential effects to land ownership and planned land uses in the Project Area and vicinity (see Section 4.10.2.3 for the analysis on impacts to private land ownership). The primary impacts to land use associated with the Project are associated with ROWs, designated utility corridors, residential uses, mining claims, aviation uses, recreation, wilderness, and livestock grazing. Surface or mineral ownership would not be impacted under any alternatives because surface jurisdiction and mineral ownership would not change (see Section 4.3.2.1 for the analysis on impacts to minerals). The analysis area considered for the land use, recreation, and livestock grazing is the Project Area and vicinity.

4.8.1 Analysis Methods

The 1995 Kingman BLM Resource Management Plan and the 2010 Mohave County General Plan were considered when evaluating potential impacts on land ownership and use patterns in the Project Area. The Mohave County Board of Supervisors approved an amendment to the Mohave County General Plan on August 6, 2012, changing the existing land use designation of the Project Area from Rural Development Area (RDA) to Rural Development Area, Alternative Energy (RDA, AE). The Project Area was rezoned from A-R/36A (Agricultural Residential/thirty-six acre minimum lot size) to establish an E-W (Energy Overlay-Wind) zone so that the proposed wind farm would be in compliance with the Mohave County General Plan. However, Mohave County has limited authority to apply this designation to Federal (BLM- or Reclamation-administered) land but states in its General Plan that Mohave County should "coordinate its planning efforts with those of state and Federal agencies in order to set and carry out compatible planning and development policies" (Mohave County 2005 and Mohave County 2010). Based on the existing and allowable uses in the Project Area, along with the existing and planned uses on nearby private land (under jurisdiction of Mohave County), impacts on land use were identified and compared by alternative based primarily on the following criteria:

- Project elements would conflict with adopted plans for the Project Area or surrounding vicinity.
- Project elements would interfere with established and/or approved access to or uses in the Project vicinity, including but not limited to, residential development, mining, recreation, private airstrips, livestock grazing.

4.8.2 Alternative A – Proposed Action

The construction and operation of 203 to 283 wind turbines (depending on the turbine size chosen) and ancillary facilities would be in conformance with the existing BLM Resource Management Plan and would not conflict with the Mohave County General Plan, as amended on August 6, 2012. The Project Area is not located in any BLM protected areas or designated ROW exclusion or avoidance areas. It is located in a BLM Visual Resource Class IV area, which allows major modifications that may dominate the landscape character. Development of a wind farm would not prohibit other permitted uses such as grazing, existing ROWs, and dispersed recreation. Alternative A would also be consistent with the Mohave County General Plan energy goals and implementation measures as described in Chapter 3 (Mohave County 2010).

4.8.2.1 Construction

The two existing east/west utility corridors located in the southern portion of the Project Area include the 500-kV Mead-Phoenix transmission line and the 345-kV Liberty-Mead transmission line. Alternative A would use either of these existing transmission lines to tie into the electrical grid. The development of facilities other than an overhead power line, are restricted in the existing utility corridors. Using the existing designated utility corridors and transmission lines in the vicinity of the Project Area would not result in a change in land use. Construction of turbines and other Project facilities (including switchyards, met towers, staging areas, operations and maintenance facilities, and access roads) would not impact existing transmission lines or utility corridors.

There are no commercial operations or private lands within the Project Area. However, there are light industrial uses, small mining claims, and residential land uses adjacent to the Project Area that could be affected by the proposed construction of 203 to 283 wind turbines, access roads, and ancillary facilities.

Livestock grazing allotments within and adjacent to the Project Area also could be affected by the proposed construction. Access to mining claims and residential areas adjacent to the Project Area could be temporarily restricted during construction in site-specific areas. Such restrictions would be minor because a new access road from US 93 to the Wind Farm Site would be established, but the oversized loads and slow-moving equipment on public roads and highways could result in temporary delays for local users. Dust and noise from construction activities, and additional vehicle traffic, could indirectly impact residences adjacent to the Project Area over the short term; these impacts would be minimized and mitigated through the application of water or other dust suppressants. Any residual impacts would be temporary, occurring for a few months during construction, in specific areas such as the Project access road corridor (see Section 4.9 for discussion on Transportation and Access).

Construction noise impacts are analyzed in Section 4.15 and considered, where identified, temporary. Some construction activities (such as turbine assembly and concrete pouring) could occur at night when wind speeds are often lower and temperatures are cooler. However most use of heavy construction equipment is assumed to occur during daylight hours, and during such time when background sound levels (in general) tend to be higher than nighttime due to the presence or activity of other typical daytime sources (e.g., increased levels of traffic, non-Project commercial/institutional/municipal operations and residential activities, building heating, ventilation, and air conditioning systems, etc., as compared to nighttime). Hence, higher daytime background sound level might be said to help “minimize” the difference between it and the impact-generating predicted construction noise level. In some cases, and depending on location, magnitudes of the contributing sound sources, and other factors, the difference may be imperceptible. Similarly, if background sound was considered generally quieter during weekend daytime hours than those during regular weekday daytime hours, then weekday daytime construction activity could offer this potential to “minimize” noise impacts to residents.

While the Project Area is not known to be used extensively for recreational purposes, the expanse of public land and existing access offers recreational opportunities, including OHV use, camping, and hunting. Regional recreational pursuits also include backpacking, horseback riding, hiking, rockhounding, fishing, mountain biking, and wildlife viewing. The ground disturbance, equipment movements, noise, dust, presence of construction crews, and public safety concerns would generally discourage most recreationists from visiting the Project Area during construction. Ground disturbance and the presence of construction equipment and vehicles could temporarily change the character of the landscape, reduce opportunities for naturalness, and reduce the semi-primitive recreation experience near the Project Area. Public access for recreation (including OHV travel) through the Project Area would be temporarily restricted or delayed during construction for safety and security reasons. Given the unknown amount of recreational use in the Project Area, and the surrounding areas available for similar recreational activities and experiences, impacts on the recreation setting and experience would be minor and short-term during construction. Effects from construction intervals would be the same as those described previously but there could be an increase in the duration of construction activities and vehicle traffic. However, these effect could occur over a smaller area during a given time period. If constructing the Project in two or more intervals resulted in construction activities being conducted after the 2-year segregation order expires, and a mining claim within the Wind Farm Site was filed, this could result in conflicts between land uses. Construction intervals could result in a minor short-term reduction in the adverse effects on the recreation setting in portions of the Project Area without construction activities.

Impacts on visitors to Lake Mead NRA would be similar to those impacts on recreational users described above, with one notable difference. Disruptions to visitor access along Temple Bar Road would not be expected because this is not a proposed access route, and construction workers would be directed to access the Project Area from the southwest, where the road to the Detrital Wash materials pit would be improved and extended.

Construction related traffic, oversized loads, and slow-moving equipment on public roads and highways could indirectly result in minor, temporary delays for those trying to access Mount Wilson Wilderness, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam. As the total number of turbines and other facilities would not change, the impacts from construction intervals would be the same; however, there could be an increase the time period when temporary minor delays occur due to construction-related traffic.

Construction activities would result in the loss of or damage to vegetation which could indirectly impact livestock forage availability in localized areas in Big Ranch Units A and B. Only a negligible reduction in animal unit months (AUMs) would occur from 317 acres of long-term disturbance which represents less than 1 percent of the total area within the Wind Farm Site. Construction vehicle traffic would occur in localized areas and could result in minor short-term livestock displacement. Construction activities and equipment could also increase the potential for the establishment of invasive and noxious weeds that could indirectly affect forage quality. Dust created by vehicle traffic and construction activities could indirectly result in a temporary reduction of forage quality in localized areas. BMPs would be implemented to control dust and reduce the establishment of invasive species and noxious weeds.

Long-term adverse impacts on land use, recreation, and livestock grazing from construction activities would be reduced by avoidance measures and implementation of BMPs (Appendix B) under all alternatives to ensure disturbed sites are reclaimed and restoration efforts are successful.

4.8.2.2 Operations and Maintenance

Facility operations and maintenance, including the repair of wind turbines, ancillary facilities, and transmission line facilities would not result in impacts on utility corridors or ROWs, although the transmission line interconnection would reduce the capacity to add more power to the selected transmission line from other generation projects. Indirectly, the presence of turbines and operations and maintenance activities could result in a shift in the location or siting of future residential developments on private land. For the life of the Project, BLM and Reclamation may not be able to grant ROWs for conflicting land uses. Certain land uses on adjacent lands, such as another wind farm project, may be subject to set-backs to prevent interference with operation of the Project. Operations and maintenance activities would not result in impacts on accessing mining claims.

The proximity of the Project to Triangle Airpark (a private airstrip), located approximately 0.5 mile northeast of White Hills Road and US 93, could affect flight patterns for aircraft taking off and landing at the airpark. Private airfields are not subject to FAA airfield obstruction regulations. Aircraft would no longer be able to operate at low levels within the airspace over the Project Area because of the obstructions, which could influence take-off and landing patterns. The turbines would add an obstruction to small aircraft that may fly near or over the Project Area. Due to the turbines being taller than 200 feet, the turbines would be marked or lighted per FAA Guidelines (FAA 2007) to provide visible warning to local pilots. In addition, the distribution line that may extend along US 93 and along the primary access road to support the O&M building would add a new obstruction and potential flight safety concern. Because the airpark is not a public airport and this distribution line would be less than 200 feet high, no FAA airspace restrictions or requirements would apply to the distribution line.

The presence of Project components and maintenance vehicles and crews could result in impacts on those seeking a semi-primitive recreation setting and experience in an unmodified landscape for the duration of the Project. However, the Project Area is within the Extensive Recreation Management Area managed by BLM, and as such does not receive management for specific recreational values (such as remoteness, solitude, etc.). Noise created by the turbines could influence the presence of big game and upland game wildlife and indirectly reduce opportunities and the recreation experience for hunting and wildlife viewing. However, wildlife often habituates to routine noises so this may be a short-term effect (see Section 4.5 for discussion on Biological Resources). Because of the presence of the turbines in a previously undeveloped location, recreationists desiring a semi-primitive recreational experience may relocate to other areas, while regional visitors looking to experience man-made wonders may be attracted to the Project Area. The addition of new access roads could improve access for dispersed recreation and hunting because motorized (and non-motorized) vehicle access would be allowed on roads established in the Project Area, except for the switchyard, substations, and O&M building (see Section 4.9 for discussion on Transportation and Access). The presence of the facilities and turbines would create visual contrasts across the landscape and degrade the natural vistas of the recreation setting. The turbines and access roads would result in the greatest visual contrast across the landscape, resulting in moderate long term impacts on the quality of the semi-primitive recreation setting and experience (see Section 4.12 for discussion on Visual Resources).

Impacts on visitors who are accessing Lake Mead NRA from Temple Bar Road would be similar to those impacts on recreational users described above. Those seeking a natural vista setting to have a semi-primitive recreational opportunity may not want to visit areas of Lake Mead NRA where the turbines are visible. Because the turbines would be located closer to Lake Mead NRA with Alternative A, this action alternative would have the greatest impact on visitors to Lake Mead NRA who are seeking natural vistas.

Operations and maintenance activities would not impede access to or result in impacts on Mount Wilson Wilderness Area, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam.

The development of approximately105 miles of new Project access roads could indirectly provide better access to grazing allotments and livestock, which could improve livestock management. Natural revegetation in areas previously disturbed by construction could improve forage resources for livestock grazing. The volume of vehicle traffic associated with operations and maintenance activities on Project access roads would be substantially less than during construction, but could result in minor localized impacts on livestock and livestock management.

4.8.2.3 Decommissioning

Impacts during decommissioning would be similar to impacts during construction. Access to mining claims and residential areas adjacent to the Project Area could be temporarily restricted during decommissioning in site-specific areas. Oversized loads and slow-moving equipment on public roads and highways could result in temporary delays for local users. Such restrictions would be minor and short-term.

Project features such as turbines, substations, the switchyard, O&M building, and related facilities would be removed at the end of the operational life of the Project. The decommissioning activities would result in short-term ground disturbance and impacts on the recreational setting and experience, similar to construction activities. Recreational activities could occur during decommissioning, subject to localized restrictions for public safety and reclamation efforts. When decommissioning and reclamation is complete, there could be residual, but minor long-term impacts on the recreation setting and experience if access roads are not decommissioned and reclaimed; however, if BLM and Reclamation decide to reclaim the access roads, the landscape could be transitioned to its original, relatively undeveloped character with utilities and access road features. If access roads are left in place, they would provide additional access to some recreational users (e.g., hunters, wildlife watching).

Decommissioning activities and related vehicle traffic could indirectly result in minor, temporary delays in site specific areas for those trying to access Mount Wilson Wilderness Area, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam.

Decommissioning the Project would have similar impacts on livestock grazing as described for construction. Previously restored areas could be re-disturbed resulting in short-term loss of available forage and decrease in forage quality. Decommissioning and re-vegetating disturbed areas with native soils and plants would improve forage availability in areas where long-term disturbance had occurred and in locations where facilities had been located.

4.8.3 Alternative B

4.8.3.1 Construction

Construction of the transmission line to the switchyard interconnecting to the Mead-Phoenix 500-kV line or Liberty-Mead 345-kV line would result in the same amount of ground disturbance and impacts on existing utility corridors and ROWs as Alternative A.

Alternative B would eliminate certain turbine corridors in the northern and southern portions of the Wind Farm Site and shorten certain corridors on the eastern side of the Project Area to increase the distance between planned development communities and the nearest turbine (see Map 2-3). This would decrease visual and noise impacts during construction. More land could also be available for other future ROWs granted by BLM or Reclamation. Access to mining claims adjacent to the Project Area could be temporarily restricted during construction in site-specific areas. Impacts on mining claims would be the same as Alternative A.

Reducing the number of proposed turbines (to a maximum of 208 turbines) and the number of new access roads and other related Project features would reduce the extent of long-term ground disturbance by 56 acres and short term disturbance by 303 acres compared to Alternative A. This would reduce the impacts on the quality of the recreation setting and experience compared to Alternative A.

Eliminating the three northernmost turbine corridors from the Project Area on Reclamation-administered land near Lake Mead NRA and Temple Bar Road would reduce ground disturbance, maintain more of the natural conditions and recreation setting, and eliminate the introduction of turbines and their associated impacts to this specific area. This alternative would retain the existing distant views from certain viewpoints for those visiting or accessing Lake Mead NRA. The Project boundary would no longer abut to Lake Mead NRA, nor would additional access be provided into this area as a result of access roads that would have been established under Alternative A. Alternative B would also eliminate the southernmost corridor and shorten eight turbine corridors on the eastern side of the Project Area to increase the distance between planned development communities and the nearest turbine. Compared with Alternative A, this would reduce dust and noise from construction activities and reduce impacts to nearby residents and on the existing recreation setting. Reducing the number of turbines from a maximum of 283 under Alternative A to 208 turbines under Alternative B could reduce the amount of construction related traffic, oversized loads and slow-moving equipment on public roads and highways. This could indirectly reduce temporary delays for those trying to access Mount Wilson Wilderness Area, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam compared to Alternative A.

Constructing fewer wind turbines in Big Ranch Units A and B would reduce the amount of temporary ground disturbance in localized areas and help retain existing vegetation and forage resources for livestock grazing compared to Alternative A; however, the overall impacts on AUMs would remain negligible.

4.8.3.2 Operations and Maintenance

The operations and maintenance of turbines, access roads, operations and maintenance facilities, and transmission line would not result in any impacts on designated utility corridors, ROWs, or mining claims. Indirectly, reducing the number of turbines and operations and maintenance activities in the northeastern portion of the Project Area could reduce impacts on potential future residential developments on private land compared to Alternative A. Impacts on the airstrip from operations and maintenance activities would be the same as Alternative A.

Reducing the number of wind turbines and new access roads would reduce the extent of area exposed to noise and visual impacts associated with maintenance activities and vehicle traffic. This could maintain opportunities for those seeking a semi-primitive recreation experience in a natural setting over a larger area compared to Alternative A.

Impacts on the Mount Wilson Wilderness Area, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam from operations and maintenance activities would be the same as Alternative A.

New Project access roads could provide better access for managing livestock and operations in Big Ranch Units A and B (which include both BLM- and Reclamation-administered land). Compared to Alternative A, Alternative B would require fewer access roads (due to fewer turbines) which would reduce livestock displacement since less acreage would be disturbed, however, overall impacts on AUMs would be negligible.

4.8.3.3 Decommissioning

Reducing the number of turbines from a maximum of 283 under Alternative A to 208 turbines under Alternative B could indirectly reduce the amount of vehicle traffic and temporary delays for those trying to access mining claims and residential areas compared to Alternative A.

Decommissioning the Project would result in the same impacts as Alternative A except that fewer turbines would require decommissioning which could reduce the extent of ground disturbance and impacts on the recreation setting and experience compared to Alternative A. Noise and visual impacts from vehicles and equipment used during decommissioning would be reduced near private lands with residential development because of the greater distance between turbines and private land with Alternative B compared to Alternative A.

Decommissioning fewer turbines could indirectly reduce vehicle traffic and temporary delays in site specific areas for those trying to access the Mount Wilson Wilderness Area, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam compared to Alternative A.

Decommissioning fewer wind turbines in Big Ranch Units A and B would reduce the amount of temporary ground disturbance in localized areas and help retain existing vegetation and forage resources for livestock grazing compared to Alternative A, overall impacts on AUMs would remain negligible.

4.8.4 Alternative C

4.8.4.1 Construction

Construction of the transmission line to the switchyard would result in the same amount of ground disturbance and impacts on existing utility corridors and ROWs as Alternative A and B.

The construction of up to 208 turbines under Alternative C would result in the same impacts as Alternative B but less ground disturbance and impacts compared to Alternative A (203 to 283 turbines). However, the turbine corridors on the eastern portion of the Project Area would be shortened to provide greater separation between planned development communities and the nearest turbines compared to Alternative B. This would decrease visual impacts and noise to a greater extent than Alternatives A and B. Reducing the number of turbines could decrease vehicle traffic and temporary delays during construction for those trying to access mining claims compared to Alternative A. Impacts on mining claims would be the same as Alternative B.

Decreasing the number of proposed turbines to a maximum of 208 turbines and other Project features such as access roads would result in approximately 1,264 acres of temporary ground disturbance under Alternative C. This could reduce noise and visual impacts from construction activities and reduce impacts on the quality of the recreation setting and experience compared to Alternative A, which would have about 273 more acres of temporary ground disturbance (Alternative A would have 48 more acres of long-term disturbance compared to Alternative C). Impacts from construction activities would be similar to Alternative B (Alternative B would have 7 fewer acres of long-term disturbance compared to Alternative C) except that one additional turbine corridor would be located on Reclamation-administered land which could result in more noticeable visual impacts and reduce the distant naturalness quality of the recreation setting and experience for those visiting Lake Mead NRA.

Reducing the number of turbines from a maximum of 283 under Alternative A to 208 turbines under Alternative C could reduce the amount of construction related traffic, oversized loads and slow-moving equipment on public roads and highways. This could indirectly reduce temporary delays for those trying to access the Mount Wilson Wilderness Area, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam compared to Alternative A, but result in the same impacts as Alternative B.

Decreasing the number of turbines and acres of temporary ground disturbance under Alternative C could help retain existing vegetation and forage resources over a larger area compared to Alternative A. Impacts from construction activities on livestock grazing would be similar to Alternative B except that disturbance and impacts on livestock grazing would shift from the east side of the Project Area where turbine corridors were shortened to Reclamation-administered land and Big Ranch Unit B due to an additional turbine corridor in that area.

4.8.4.2 Operations and Maintenance

The operations and maintenance of turbines, access roads, operations and maintenance facilities, and transmission line would not result in any impacts on designated utility corridors or ROWs. Under Alternative C, the corridors on BLM-administered land are shortened even further to provide greater separation between private lands and the nearest turbines. This could reduce the visual and noise impacts associated with operations and maintenance activities compared to Alternatives A and B. Impacts on mining claims and the private airstrip from operations and maintenance activities would be the same as Alternatives A and B.

Reducing the maximum number of turbines to 208 and the associated new access roads would reduce the extent of area exposed to noise and visual impacts associated with maintenance activities and thus help to retain the existing recreation setting compared to Alternative A (203 to 283 turbines). The operations and maintenance of 208 turbines and new access roads would result in the same impacts on the recreation setting and experience as Alternative B with the exception that Alternative C would have a greater visual impact on Lake Mead NRA because turbines would be closer to the NRA than Alternative B.

Impacts on the Mount Wilson Wilderness Area, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam from operations and maintenance activities would be the same as Alternatives A and B.

Compared to Alternative A, Alternative C would require fewer access roads (due to fewer turbines) which would reduce livestock displacement since less acreage would be disturbed, however, overall impacts on

AUMs would be negligible. Impacts on livestock grazing from the operations and maintenance of turbines and access roads would have the same impacts as Alternative B.

4.8.4.3 Decommissioning

Decommissioning the Project would have the same impacts as Alternative B except the turbine corridors on the eastern portion of the Project Area would be shortened to provide greater separation between the private lands and the nearest turbines compared to Alternative B. This would decrease visual and noise impacts on residential areas to a greater extent than Alternatives A and B. Reducing the number of turbines from a maximum of 283 under Alternative A to 208 turbines under Alternative C could indirectly reduce temporary delays for those trying to access mining claims compared to Alternative A. Impacts on mining claims would be the same as Alternative B.

The decommissioning of up to 208 turbines, access roads, and related facilities would have similar, though slightly less, ground disturbance and impacts on the quality of the recreation setting and experience compared to Alternative A. Decommissioning up to 208 turbines, access roads, and related facilities would have the same impacts on the recreation setting and experience as Alternative B.

Decommissioning fewer turbines (208 turbines) could indirectly reduce temporary delays in site specific areas for those trying to access Mount Wilson Wilderness, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam compared to Alternative A (283 turbines). Impacts on Mount Wilson Wilderness would be the same as Alternative B.

Decommissioning the Project under Alternative C would result in less temporary surface disturbance and loss or damage to available forage for livestock grazing in the northeastern and northwestern part of the Project Area compared to Alternative A. Disturbance and impacts on livestock grazing Reclamation-administered land and Big Ranch Unit B would be greater than Alternative B. However, once reclamation efforts are fully implemented and revegetation has occurred, the long-term effects from decommissioning would be comparable among all action alternatives.

4.8.5 Alternative D – No Action

Existing and planned land uses within the Project Area and vicinity including ROWs, utility corridors, residential areas, mining claims, private airstrip, wilderness, recreational uses, and livestock grazing operations would not change under this alternative. Recreation would continue to be managed under applicable plans based on land ownership and jurisdiction. There would be no change to the recreational experience for persons visiting Lake Mead NRA.

Management guidelines would remain for the Wind Farm Site and surrounding vicinity, as directed by the BLM Kingman Resource Management Plan, Mohave County General Plan, and Reclamation policies.

4.8.6 Alternative E – Agencies' Preferred Alternative

4.8.6.1 Construction

Construction of the transmission line to the switchyard interconnecting to the Mead-Phoenix 500-kV line or Liberty-Mead 345-kV line would result in the same amount of ground disturbance and impacts on existing utility corridors and ROWs compared to all other action alternatives.

Alternative E would eliminate corridors in the northeastern portion of the Wind Farm Site to increase the distance between planned development communities and the nearest turbine, and to decrease visibility from the proposed wilderness in Lake Mead NRA. The elimination of these corridors would decrease visual and noise impacts during construction compared to Alternative A and result in the same impacts compared to Alternatives B and C. Similar to other action alternatives, access to mining claims adjacent to the Project Area could be temporarily restricted during construction in site-specific areas.

Alternative E would prohibit construction of turbines in the northwest corner of the Wind Farm Site which would reduce the visual and noise impacts on Lake Mead NRA compared to other action alternatives and particularly to Alternative A. With the exception of the turbines that could be built in Township 29 North, Range 20 West, Section 2, the elimination of these turbine corridors would reduce visual and noise effects for visitors accessing the recreation area from the Temple Bar Road entrance station and for persons recreating in the Mount Wilson Wilderness Area and the NPS lands adjacent to the Wind Farm Site.

Reducing the number of turbines from a maximum of 283 under Alternative A to 243 turbines under Alternative E could reduce the amount of construction related traffic, oversized loads and slow-moving equipment on public roads and highways. This could indirectly reduce temporary delays for those trying to access Mount Wilson Wilderness, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam compared to Alternative A. Alternative E could result in a minor temporary increase in traffic related delays compared to Alternatives B and C due to the increase in turbines.

Constructing fewer wind turbines in Big Ranch Units A and B would reduce the amount of temporary ground disturbance in localized areas and help retain existing vegetation and forage resources for livestock grazing compared to Alternative A and increase the temporary reduction in forage compared to Alternatives B and C. However, the overall impacts on AUMs would remain negligible.

Reducing the number of proposed turbines (to a maximum of 243 turbines) and the number of new access roads and other related Project features would reduce the extent of long-term ground disturbance by 49 acres and short term disturbance by 219 acres compared to Alternative A. This would reduce the impacts on the quality of the recreation setting and experience compared to Alternative A. Increasing the number of turbines under Alternative E could increase impacts on the recreation setting and experience compared to Alternatives B and C.

Alternative E includes phasing construction so that certain corridors would be used only if needed to meet nameplate capacity requirements (see Maps 2-11 to 2-13). The last phases that would be built are those in the southernmost corridor with the turbines nearest to existing residences built last. If the southernmost corridor is needed, the effects on residences and private property to the south would be the same as Alternative A and if the corridor is not needed, the effects on the private property would be the same as with Alternatives B and C. If the southernmost corridor is not needed, the other corridors that would be built only if needed would be those on Reclamation land south of the golden eagle nest avoidance area. Not only would this reduce potential impacts on golden eagles, but it would also further reduce the impacts on visitors to Lake Mead NRA by increasing the distance between NPS land and turbines.

4.8.6.2 Operations and Maintenance

The operations and maintenance of turbines, access roads, operations and maintenance facilities, and transmission line would not result in any impacts on designated utility corridors, ROWs, or mining claims. Indirectly, reducing the number of turbines and operations and maintenance activities in the northeastern portion of the Project Area could reduce impacts on potential future residential developments on private land compared to Alternative A. Impacts on the airstrip from operations and maintenance activities would be the same among all the action alternatives.

Reducing the number of wind turbines and new access roads would reduce the extent of area exposed to noise and visual impacts associated with maintenance activities and vehicle traffic. This could maintain opportunities for those seeking a semi-primitive recreation experience in a natural setting over a larger area compared to Alternative A. Impacts on the recreation experience could increase under Alternative E compared to Alternatives B and C due to the increase in the number of turbines and maintenance activities.

Visual and noise impacts on the Mount Wilson Wilderness Area, NPS proposed wilderness, Lake Mead NRA, and Hoover Dam from operations and maintenance activities would be the same among all action alternatives.

New Project access roads could provide better access for managing livestock and operations in Big Ranch Units A and B (which include both BLM- and Reclamation-administered land). Compared to Alternative A, Alternative E would require fewer access roads (due to fewer turbines) which would reduce livestock displacement since less acreage would be disturbed, however, overall impacts on AUMs would be negligible. Livestock displacement could increase slightly compared to Alternatives B and C due to the increase in turbines and access roads under Alternative E.

4.8.6.3 Decommissioning

Decommissioning the Project would have the same impacts as discussed under Section 4.8.3.3 for Alternative B. The decommissioning of up to 243 turbines, access roads, and related facilities would have similar, though slightly less, temporary ground disturbance and impacts on the quality of the recreation setting and experience compared to Alternative A. Decommissioning up to 243 turbines, access roads, and related facilities would increase impacts on the recreation setting and experience compared to Alternatives B and C.

Decommissioning the Project under Alternative E would result in less temporary surface disturbance and loss or damage to available forage for livestock grazing in the northeastern and northwestern part of the Project Area compared to Alternative A. Disturbance and impacts on livestock grazing Reclamation-administered land and Big Ranch Unit B would be greater than Alternative B. Once reclamation efforts are fully implemented and revegetation has occurred, the long-term effects from decommissioning would be comparable among all alternatives.

4.8.7 Mitigation Measures

The BLM and operators would continue to contact appropriate agencies, property owners, and other stakeholders during the permitting process to identify potentially sensitive land uses, and local and regional land use concerns. This would help maintain conformance with existing land use plans.

Under all alternatives, operators would plan for efficient use of the land and areas disturbed by construction, operation, and decommissioning of the Project through the use of the BMPs described below and in Appendix B.

The Project would utilize existing roads and utility corridors to the maximum extent feasible; this would minimize the disturbance areas for new roads, lay-down areas, and borrow areas. All electrical collector lines would be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance). Overhead lines may be used in cases where burial of lines would result in further disturbance (Appendix B).

BP Wind Energy and their contractors would implement a noise complaint process and hotline number for usage by members of the surrounding community (e.g., White Hills, Arizona). Upon establishment of the hotline, BP Wind Energy or its compliance inspectors would have the responsibility to receive, evaluate, and coordinate with the BLM or Reclamation representatives, respectively, and when appropriate make reasonable efforts to resolve noise complaints. The resolution and evaluation of noise complaints would be subject to appropriate criteria as described in this Final EIS (Section 4.15.6), and as identified as the Mohave County Noise Standards – Maximum Noise Levels for Various Land Uses (Figure 3-7).

Mitigation measures would be in place to manage the growth and spread of noxious weeds and other undesirable plants through implementation of the Integrated Reclamation Plan, which could help retain the existing recreation setting and experience, and livestock forage resources. Turbine design elements would include visual uniformity and use of tubular towers to minimize the visual contrast of the Project features across the landscape that could degrade the quality of the recreation setting and experience. If Project access roads are removed after decommissioning and re-graded and revegetated, this could help restore livestock forage resources and the existing recreation setting and experience. In addition, reclamation efforts would use native seed mixtures to further minimize the spread of noxious weeds, provide a better opportunity for successful revegetation, and help the area appear more natural once reclaimed.

4.8.8 Unavoidable Adverse Impacts

Unavoidable adverse impacts could occur for those seeking a more semi-primitive recreation setting and experience within an undisturbed landscape due to the presence of the wind turbines and associated facilities. These impacts would occur over the duration of the wind farm operations; however, many other locations in the region would still afford opportunities for a natural vista setting or semi-primitive recreation experiences.

4.9 TRANSPORTATION AND ACCESS

This section describes the potential impacts on the local transportation network that could result from implementing the alternatives for this Project. Factors analyzed include access, traffic, and vehicle type changes on major highways, local arterial and collector roads, and any new proposed roadways in the area that would be required due to Project design. The analysis areas specific to this section includes the roads that would be used for access to the Project Area, which would be US 93, and unpaved/unmarked access roads within the Project Area and its vicinity. Travel by Project construction and operational vehicles are not expected on Temple Bar Road or White Hills Road; therefore, no impacts on transportation or access on these road would be anticipated.

4.9.1 Analysis Methods

Assessment of potential effects on transportation and access was based primarily on reviewing the existing Annual Average Daily Traffic (AADT) levels on each respective roadway together with the expected increase on those roads due to construction, operation, and decommissioning of the Project. Data for traffic analyses were obtained from the Arizona Department of Transportation (ADOT). The potential for the Project to result in an increase in vehicular traffic and accidents was analyzed for US 93 between Pierce Ferry Road and the Arizona/Nevada state line. Additionally, the trip count data in the Transportation and Traffic Plan (BP Wind Energy 2013) that was developed for this Project were used to assess the projected impacts against the projected volume of traffic (Appendix C).

Impacts on local traffic were analyzed for sections of state and Federal highways and local collector roads that provide access to the Project. The primary impacts on the transportation network would result from creating new roads; changing access to, from, and within the Project Area; creating a disruption to local and regional traffic patterns, and a change in the type of vehicles using the transportation network.

4.9.2 Alternative A – Proposed Action

4.9.2.1 Construction

Alternative A would increase vehicular traffic on the Wind Farm Site and in its surrounding areas. Project construction would require both temporary and permanent Project roads (at least for the life of the Project); public access to these roads would generally be restricted for safety and security reasons. This would result in short-term impacts to the local transportation network and access to the Wind Farm Site for the duration of construction. Temporary construction roads would include a 56-foot maximum disturbance area, but would generally be a disturbance width of 36 feet, which would decrease to a 20-foot width upon completion of construction. The temporary construction disturbance width for the roads connecting the turbine corridor roads would also be similarly designed, but would require up to a temporary disturbance width of 75 to 136 feet to accommodate the collector lines that would be installed parallel to the roads. The disturbance along the connecting roads would stair step in size as multiple collection lines are routed in parallel heading into the substations, as discussed in Section 2.5.2.10. Per BMPs, a Transportation and Traffic Plan has been developed to address Federal, state, and local requirements based on the proposed Project transport needs, and expected increase in construction traffic (Appendix C). A 20-foot-wide road would also be constructed along the entire length of the proposed transmission line for access to the line for the duration of the Project.

Alternative A would include site access from US 93 via the road that is currently serving the BLM aggregate pit located in Detrital Wash. The existing road is approximately 1.5 miles long and would be upgraded and include an extension of up to 1.06 miles to access the Wind Farm Site. On-site access roads, including both new roads and upgrades to existing roads, would be constructed creating a temporary construction disturbance of up to approximately 805 acres. It is anticipated that the construction timeframe would span 12 to 18 months (52 to 78 weeks) and include varied levels of construction traffic throughout that duration. There are several components associated with construction, and each has a specific transportation requirement associated with delivery or access to the Wind Farm Site. These components are discussed in the following paragraphs and Table 4-17 provides a summary of the transportation requirements.

Table 4-17 Estimated Number of Vehicle Round Trips into the Project Area (During Total Construction Period)

Transport Vehicle Category	Expected Number of Round Trips
Turbine Components	2,830
Aggregate and Water	1,300
Concrete Delivery Vehicles	1,300
Mobilization and Demobilization	500
Personnel Transport	50,000 – 75,000
Total	**55,930 – 80,930**

SOURCE: Transportation and Traffic Plan, Appendix C.2.8

Depending on vendor shipping configuration, each turbine would require 7 to 16 semi-trailer loads of equipment or materials. For Alternative A, there would be a maximum of 283 turbines, which would result in 1,981 to 4,528 round trips for turbine transport vehicles. The majority of turbine vendors require an average of 10 trucks per turbine; therefore, it is expected there would be roughly 2,830 round trips for turbine deliveries.

For this Project, aggregate and water are planned to be obtained from within the Project Area (from the existing BLM aggregate pit along the main access road), and so the trip count primarily reflects the initial arrival of vehicles on site to start the day and their departure at the end of the work day (assuming they leave the site). Assuming eight aggregate and two water trucks are needed per day over a 26 week period (five day work week), 1,300 rounds trips would be required for aggregate and water trucks (which would likely be less as some truck drivers would elect to leave trucks on site overnight). It is planned that the aggregate and water trucks would enter and exit the site only once per day, and that the majority of their movement would be within the Project Area.

The Project would use on-site concrete mixing and batching plants, with the concrete mixed and hydrated at each batch plant. It is assumed that the concrete mixer trucks would make only one round trip per day, arriving at the Project Area in the morning and departing at the end of the shift. Assuming 10 concrete mixer trucks during a 26 week period (five day work week), 1,300 round trips would be required for bringing the concrete mixer trucks to and from the Project Area. Should some truck drivers elect to leave trucks on site overnight, this number of round trips would be reduced accordingly. The majority of the mixer truck movements would be within the Project Area as they haul concrete from the batch plants to turbine or other foundation sites.

Construction mobilization would require one trip to the Project Area. Excluding the trips for the wind turbines, based on previous projects, it is expected there will be approximately 500 round trips (250 individual trips) would be required to deliver construction equipment, substation equipment, electrical and transmission equipment and materials, and miscellaneous facilities equipment.

The number of construction personnel would range from 90 to a peak of 500 during peak construction, with an average of 300 workers during the 12- to 18-month construction period. Assuming estimated 52 week construction duration (5 day work week) with an average of 300 workers, there could be 50,000 to 75,000 round trips for personnel transports for the construction duration[1]. BP Wind Energy would request construction personnel use a ride sharing program to reduce the number of vehicles entering and exiting the site on a daily basis.

Due to the location of the site access road, it is not expected that construction traffic or on-site Project related traffic would negatively impact residential traffic in the surrounding areas. Based on 2011 ADOT AADT along US 93 between the Arizona/Nevada State Line at Pierce Ferry Road, the proposed peak construction schedule would increase daily traffic volume by 4 percent over the existing level. Oversized and slow-moving transport vehicles on US 93 could result in temporary traffic delays for both local traffic and motorists traveling to Lake Mead NRA via Temple Bar Road, but US 93 has been widened from Kingman to the Arizona/Nevada state line to two lanes of traffic in each direction so that faster moving vehicles could go around the transport vehicles.

Constructing the Project in two or more intervals could increase the duration of construction-related traffic on US 93, although the volume of such traffic would be lighter during a given construction interval because less equipment would be hauled during the construction time period. Over time, temporary traffic delays would be comparable to building in a single construction interval because the same amount of materials and equipment to build the turbines would be hauled. However, if the construction intervals require re-mobilization of cranes and other construction equipment, the volume of construction-related traffic on US 93 could potentially be greater than with a single construction interval, resulting in slightly more temporary traffic delays.

[1] One trip is defined as a round trip (that is a vehicle exiting the last public roadway, US 93, entering into the Project site, and then returning back to the public roadway).

The entire Project Area is accessible for OHV use on existing roads, trails and washes. Throughout construction the proposed Project, access to the Project Area for OHV use would be limited due to construction activity, and the associated temporary warning fences or barricades that would be in place to protect public safety. It is not known if there would be an increase in private vehicle traffic from members of the public interested in viewing wind farms construction, but any vehicle traffic on the Project Area would be limited in the same manner as OHV use.

4.9.2.2 Operations and Maintenance

Operations and maintenance would not require the wide access roads necessary for construction; consequently, road widths would be reduced to a long-term disturbance width of 20 feet. The amount of total long-term disturbance from post-construction access roads would decrease from 805 acres to 253 acres for Alternative A. The number of Project personnel working on site year-round to perform operations and maintenance activities is estimated at 30 people (Section 4.10.2.1) and, due to the low amount of resulting traffic to the site, Project operations and maintenance activities would have little measurable effect on the current AADT levels along US 93 in the Project vicinity.

Operations and maintenance activities would limit access to some areas on the Project Area because certain areas such as the O&M building, substations, and switchyard, would be fenced and restricted to authorized personnel (refer to Chapter 2, Site Security). This should not affect OHV use, as fenced areas with restricted access could be located outside of existing travel route locations. Additional areas also may be closed temporarily to public access, as necessary, for maintenance activities. About 104 miles of new access road would be added with Alternative A, although most of this roadway would be access along turbine corridors and not through roads. If a crane is needed for repair, the crane would be brought in on trucks and assembled at the turbine site such that the permanent 16-foot wide road (20-foot wide with shoulders/ditches) would be sufficient for site access, and the 10-foot wide shoulders would not need to be reinstalled. The day-to-day operation of Alternative A would not be expected to adversely impact the use of OHVs on and around the Project Area due to the abundance of open accessible land adjacent to the Project Area available for OHV use. Additionally, operations and maintenance of the proposed Project would not impact residential traffic or access in the surrounding areas because there would be no discernible increase in AADT in the surrounding areas. Since access to the Project Area would be via US 93, no residential areas would be impacted.

4.9.2.3 Decommissioning

The transportation impacts to the Project Area and its surrounding areas during decommissioning would be similar to those identified during Project construction since it is assumed that personnel and equipment requirements would be similar. While aggregate and water trucks for mixing concrete would not be necessary, trucks to haul out the portions of foundations that would be removed, and some water trucks would be needed for dust control.

Project access roads would be decommissioned and restored to pre-construction conditions where appropriate. The impact on US 93 traffic would be similar to those impacts identified during construction and increased traffic volumes are anticipated to be sustained for the entire duration of decommissioning. During decommissioning, the existing equipment would be removed, and a Decommissioning Plan would be developed to address the procedures (see Section 2.5.5). During decommissioning, there would be coordination with ADOT regarding treatment of the improvements made within the US 93 ROW to accommodate truck movements to the access road leading to the Wind Farm Site to determine if the improvement would be retained or reclaimed.

4.9.3 Alternative B

4.9.3.1 Construction

Construction impacts to the transportation network for Alternative B would be similar to those identified for Alternative A. While road widths would remain consistent between alternatives, the amount of total on-site disturbance from road construction varies. It is expected that Alternative B would include about 80 miles of new access road within the Wind Farm Site and improvements to about 6 miles of existing road, resulting in about 635 acres of temporary roadway construction disturbance compared to 805 acres for Alternative A.

The amount of construction traffic would be similar to that of Alternative A, but could require fewer construction vehicle trips if there were a decrease in the number of turbine component transports and an associated decrease in the amount of construction traffic internal to the Wind Farm Site. Other construction traffic involving worker and on-site transport would be consistent among all alternatives.

4.9.3.2 Operations and Maintenance

Transportation and access impacts during operations and maintenance for Alternative B would be the similar those identified in Alternative A. However, the total long-term on-site disturbance for roadway development would be 199 acres for Alternative B compared to 253 acres in Alternative A.

The amount of on-site traffic due to operations and maintenance would be consistent among all alternatives because the number of operations personnel for the four action alternatives would be the same.

4.9.3.3 Decommissioning

The decommissioning of Alternative B would be similar to that of Alternative A, but would require fewer vehicle trips than Alternative A because there would be fewer turbines to decommission and thus fewer turbine component and turbine foundations to remove and haul from the site.

4.9.4 Alternative C

4.9.4.1 Construction

Construction impacts to the transportation network for Alternative C would be similar to those identified for Alternatives A and B. While road widths remain consistent among all of the action alternatives, the amount of total on-site disturbance from road construction varies. It is expected that Alternative C would include approximately 26 miles more new and existing access roads compared with Alternative B with 665 acres of temporary roadway construction disturbance compared to 805 acres in Alternative A, and 635 acres in Alternative B.

The amount of construction traffic would be similar to that of Alternative A, but could require fewer construction vehicle trips if there were a decrease in the number of turbine component transports and an associated decrease in the amount of construction traffic internal to the Wind Farm Site. Other construction traffic involving worker and on-site transport would be consistent among all alternatives.

4.9.4.2 Operations and Maintenance

Transportation and access impacts during operations and maintenance for Alternative C would be the similar those identified for Alternatives A and B. However, the total long-term on-site disturbance for roadway development would be 207 acres for Alternative C compared to 253 and 199 acres, respectively, for Alternatives A and B.

The amount of on-site traffic due to operations and maintenance activities would be consistent among all alternatives.

4.9.4.3 Decommissioning

The decommissioning of Alternative C would be similar to that of Alternatives A and B, but would require fewer vehicle trips than Alternative A because there would be fewer turbines to decommission and thus fewer turbine component and turbine foundations to remove and haul from the site.

4.9.5 Alternative D – No Action

Existing transportation and access to the Project Area and in its surrounding vicinity would not change with Alternative D, the No Action Alternative. Under this alternative the Project would not be constructed and recreational and residential access would not be expected to change, with OHV access continuing to be managed in accordance with the BLM Kingman Resource Management Plans and as regulated by Mohave County Ordinance 87-02, which is the Ordinance for Off Road Motor Vehicles (Mohave County 1987). The traffic projections developed by ADOT along US 93 in the vicinity of the Project Area would not be influenced by the proposed Project; however, ADOT projections for US 93 between the Nevada State Line and Pierce Ferry Road project daily traffic to rise to 12,000 vehicles per day by 2029 (ADOT no date). ADOT forecast information acknowledges that the projection rates do not represent refined estimates of anticipated traffic volumes.

4.9.6 Alternative E – Agencies' Preferred Alternative

4.9.6.1 Construction

The road network associated with Alternative E (see Maps 2-11 to 2-13) is similar to the access roads identified with Alternative A, but with the omission of roads in the northwest portion of the Wind Farm Site, which is comparable to Alternative B. Alternative E is expected to include approximately 90 miles of interior roads (improving about 5 miles of existing road and developing about 85 miles of new road), resulting in about 661 acres of temporary ground disturbance and 207 acres of long-term ground disturbance. The temporary and long-term disturbance may be less if the nameplate generation capacity can be met without disturbing some of the areas within Alternative E.

Table 4-18 Access Roads Area of Disturbance

	Temporary Roadway Disturbance	Long-term Roadway Disturbance
Alternative A	805 acres	253 acres
Alternative B	635 acres	199 acres
Alternative C	665 acres	207 acres
Alternative E	661 acres	207 acres

4.9.6.2 Operations and Maintenance

Transportation and access impacts during operations and maintenance for Alternative E would be the similar those identified in Alternatives A, B, and C. Like Alternative C, the total long-term on-site disturbance for roadway development would be 207 acres for Alternative E.

The amount of on-site traffic due to operations and maintenance would be consistent among all alternatives because the number of operations personnel for the three action alternatives would be the same.

4.9.6.3 Decommissioning

The decommissioning of Alternative E would be similar to that of Alternatives A, B, and C, but would require fewer vehicle trips than Alternative A because there would be fewer turbines to decommission and thus fewer turbine component and turbine foundations to remove and haul from the site.

4.9.7 Mitigation Measures

It is not expected that construction traffic or on-site Project-related traffic would negatively impact residential traffic in the surrounding areas. However, based on ADOT regulation, it may be necessary to add turning lanes to US 93 that would provide access to the Project Area in an effort to accommodate the anticipated volume of slow-moving, oversized loads and mitigate the potential for traffic back-ups on a Federal highway. Additionally, the Transportation and Traffic Management Plan, Blasting Plan, and Dust and Emissions Control Plan would be implemented and sensitive areas where disturbance needs to be avoided would be surveyed and flagged. The applicable permits needed to transport equipment and materials would be obtained and there would be close coordination with ADOT and other state transportation departments, as appropriate.

4.9.8 Unavoidable Adverse Impacts

The proposed Project could have some unavoidable adverse impacts on traffic during construction along US 93, depending on the physical upgrades necessary to provide adequate space for construction trucks entering and leaving the highway; however, these impacts would be temporary and limited to a very localized area. The proposed Project would not have any unavoidable long-term adverse impacts on transportation and access because existing highway corridors can sufficiently handle the increased traffic anticipated during construction, and new roads within the Project Area would be upgraded or developed to meet Project requirements.

4.10 SOCIAL AND ECONOMIC CONDITIONS

Potential socioeconomic effects with the area of analysis, defined as Mohave County, are presented in this section. The key socioeconomic resources addressed are employment, income, tax revenues, population, housing, and property values. Also addressed in this section are other potential effects on quality of life based on changes in environmental quality (such as air and water quality) and wildlife habitat and species abundance, as analyzed in other resource sections.

4.10.1 Analysis Methods

Data for social and economic analysis were obtained from various sources, as described in the sections that follow.

4.10.1.1 Levels of Analysis

The primary level of analysis for socioeconomic effects is Mohave County, Arizona. However, for fiscal (tax) impacts, the analysis is conducted for three levels: state, county, and municipal.

4.10.1.2 Methodology for Employment and Income Effects

Employment and labor income are common economic indicators used to measure the value of economic activity in an economy. Labor income is the sum of employee compensation (including all wages and employee benefits) and proprietor income (profits). Employment is the average number of employees, whether full or part-time, required to produce a given level of economic output. Income and employment represent the net economic benefits that accrue to a region as a result of increased economic activity. Income and employment effects of the Project construction and operations are analyzed in this section, but due to little available data, no effects are quantified for decommissioning.

The effect of the Project on Mohave County employment and labor income are analyzed using an Impact Analysis for Planning (IMPLAN) model with data specific to Mohave County. IMPLAN models include data on the linkages between different industries and facilitate the estimation of total economic effects. Total economic effects include direct effects attributable to the activity being analyzed, as well as the additional indirect and induced effects resulting from money circulating throughout the economy. Because the businesses within a local economy are linked together through the purchase and sales patterns of goods and services produced in the local area, an action that has a direct effect on one or more local industries is likely to have an indirect effect on many other businesses in the region. For example, an increase in construction would lead to increased spending in the adjacent area. Firms providing production inputs and support services to the construction industry would see a rise in their industry outputs as the demand for their products increases. These additional effects are known as the indirect economic effects. As household income is affected by the changes in regional economic activity, additional effects occur. The additional effects generated by changes in household spending are known as induced economic effects. The indirect and induced effects are larger for areas that produce the inputs and support services demanded (otherwise, inputs are imported to the region and the economic activity "leaks" from the region). Thus, the total economic impact of an activity is typically larger for areas with larger populations and larger economies.

IMPLAN is used to estimate the total economic effects in Mohave County of Project alternatives based on the direct expenditures in the local economy during construction and operations on Project-related materials and labor. As described in the sections below, Project-related expenditures would be the primary source of effects on jobs and income, though potential effects from changes in the recreation industry and change in land use are analyzed.

The Project proponent provided an overall Project construction cost estimate of $2.0 million per MW (Runyan 2010). This total cost estimate was separated into constituent elements of labor and materials using data from the Job and Economic Development Impact (JEDI) model for wind energy developed by the U.S. Department of Energy (U.S. Department of Energy 2010). The JEDI model uses industry average data on the costs of construction and operation of wind power development. As alluded to above, only the component of Project expenditures expected to be spent within Mohave County are accounted for in the analysis as only these expenditures would affect the Mohave County economy. The JEDI model provides estimates of the proportion of total costs that may be expected to be expended in the local area based on the population of the area of analysis, with areas of larger population estimated to provide a higher proportion of project inputs than areas with a smaller population.

The Mohave County population is estimated at more than 200,000 people. The JEDI model provides estimates of the proportion of local expenditure for wind farm inputs from counties with 100,000 people and 300,000 people; therefore, an average of these two values was used to estimate the proportion of inputs sourced locally from Mohave County. Using this approach, it is anticipated that approximately 7 percent of total Project construction expenditures would be spent in Mohave County. The vast majority of total Project construction expenditures, approximately 76 percent, would be spent on turbine equipment such as blades, towers and the transportation that would be produced elsewhere and transported to the Project Area. Aside from these specialized turbine components, it is expected that Mohave County residents and businesses would supply much of the non-skilled labor, goods and services required by the Project. The largest component of Project construction costs spent within the county (78 percent) would be for materials and services such as concrete, rebar, road construction, and site preparation. The second highest component of local construction Project expenditures would be for worker allowances for items such as housing, food, and other living expenses. It is anticipated that much of the labor to construct the Project is specialized, and would be sourced from outside the county, including from the Las Vegas metropolitan area and from other areas around the country.

To the extent that the Project-related expenditure pattern in the county varies from that used in the analysis, the results presented in this section may underestimate or overestimate effects. Table 4-19 summarizes the estimated total and local proportion of construction expenditures by sector for every 100 MW of wind power developed in Mohave County.

Table 4-19 Mohave County Wind Farm Estimated Construction Expenditures per 100 MW

Expenditure Type	Total Expenditure (Millions $)	Estimated Expenditure in Mohave County (Millions $)	Sector
Construction materials (concrete, rebar, roads and site prep)	$21.86	$11.16	Industry spending pattern for construction of new non-residential buildings
Worker allowances for living expenses	$7.60	$1.90	Spending pattern for $50-$75K households
Site certification and permitting	$0.52	$0.52	Management, scientific and technical services
Foundation construction labor	$0.82	$0.41	Worker compensation
High voltage substation construction material	$1.50	$0.18	Construction of new non-residential buildings
Electrical labor	$1.35	$0.12	Worker compensation
Tower erection construction labor	$0.92	$0.04	Worker compensation
Turbines (including blades, towers and transportation)	$151.25		Wind turbine manufacturing
Transformers	$2.47		Communication and energy wire and cable manufacturing
High voltage substation labor	$0.46		Worker compensation
Electrical components (drop cable, wire and high voltage cable)	$7.37		Communication and energy wire and cable manufacturing
Construction management/supervision labor	$0.70		Worker compensation
Attorneys	$1.11		Legal services
Engineering	$2.04		Management, scientific and technical services
Total Construction Costs	$199.97	$14.34	

SOURCE: Cardno ENTRIX derivation using data from National Renewable Energy Laboratory, Jobs and Economic Development (JEDI)

Similarly, Table 4-20 summarizes estimated total and local proportion of operations expenditures by sector for every 100 MW of wind power developed in Mohave County. More than 70 percent of operations expenditures are for replacement parts or insurance, which are not expected to be sourced locally (due to the specialized equipment on wind turbines, none of these parts are to be manufactured or sourced from Mohave County). However, nearly all other Project expenditures are expected to be sourced locally, so a total of 24 percent of annual operation expenditures are expected to be spent within the local economy. The major component of operations and maintenance costs that are retained within Mohave County are for operations labor, which accounts for 77 percent of the total annual local expenditures.

Table 4-20 Mohave County Wind Farm Operations and Maintenance Expenditures per 100 MW

Expenditure Type	Total Cost (Millions $)	Estimated Proportion in Mohave County (Millions $)	Sector
Operations labor	$0.38	$0.38	Employee compensation
Vehicles	$0.05	$0.02	Automotive repair and maintenance
Tools and other consumables	$0.12	$0.02	Building materials and garden supplies
Utilities	$0.02	$0.02	Electric power generation
Utilities	$0.02	$0.02	Water, sewer and other delivery systems
Fuel	$0.02	$0.02	Gas Stations
Fees, permits and licenses	$0.01	$0.01	Management, scientific and technical services
Site maintenance	$0.02	$0.00	Maintenance & repair of non-residential structures
Insurance	$0.37		Insurance Agencies
Replacement parts	$1.08		Wind turbine manufacturing
Total Operations and Maintenance Costs	$2.09	$0.50	

SOURCE: Cardno ENTRIX derivation using data from National Renewable Energy Laboratory, Jobs and Economic Development (JEDI)

4.10.1.3 Fiscal Effect Methodology

The fiscal effects of the Project are analyzed for four types of taxes: personal income tax, transaction privilege tax (TPT), use tax, and property tax. While other business taxes may also increase tax revenues, it is expected that these would be the primary sources of increased taxes from the Project. Regarding income tax, workers residing outside of Arizona, or who were previously unemployed before being hired onto the Project, would provide new personal income tax funds to the State of Arizona. Further, local purchases of many goods and services from within the county and State would be subject to taxation under the TPT. Expenditures on Project materials and labor not purchased within Arizona are not subject to the TPT, but would be subject to the provisions of the Arizona use tax. TPT and use taxes would accrue to the state, the county, and municipalities in the county. Property taxes would be assessed based on the value of the Project and would be collected by the State of Arizona and then distributed to Mohave County.

Income Tax

Arizona levies a personal income tax on both residents and nonresidents earning income in Arizona. Increases in personal income tax would be a result of an increased workforce with increased income. All income earned in Arizona is subject to the state income tax, with income tax rate ranging from 2.5 to 4.5 percent of taxable income (State of Arizona 2010a). The average income tax receipt of total income is roughly 1.1 percent. This rate was calculated using the ratio of total income tax receipts of $1.8 billion (State of Arizona June 2010b) to total estimated income of $159.4 billion (Census 2010a)[2].

Transaction Privilege Tax

The Transaction Privilege Tax (TPT) is a tax on the privilege of doing business in Arizona and applies to all sales, both labor and materials, and to all transactions including wholesale, retail, and business-to-business made in Arizona (State of Arizona 2010c). The Arizona TPT is a flat tax of 6.6 percent, and

[2] Total income for Arizona was estimated from Census data by multiplying the per capita income of $25,203 by the population of 6,324,865 (Census 2010a).

Mohave County has an additional TPT rate of 0.25 percent. The largest cities in Mohave County, including Colorado City, Bullhead City, Kingman, and Lake Havasu City, have a TPT rate of 2 percent. It is assumed that materials purchased within Mohave County are purchased within cities, resulting in a total TPT tax rate of 8.85 percent.

Use Tax

The Use Tax is imposed upon the purchaser of tangible personal property that is used, stored, or consumed in Arizona when the sale was not subject to the TPT. The use tax in Mohave County applies to the purchase of tangible goods from outside of Arizona and is taxed at the same rates as identified in the TPT. Purchases subject to a use tax are exempt from the TPT (State of Arizona 2009a). Materials purchased for the Project subject to the use tax would be taxed by the State of Arizona and Mohave County, at a total rate of 6.85 percent. Materials are only subject to the use tax if the sales tax rate of the state where these materials were purchased is less than the project area use tax rate of 6.85 percent (State of Arizona 2009a). As it is not known what sales tax would be levied on materials purchased outside of Arizona, this analysis assumes that all materials purchased elsewhere would be subject to the use tax, and may therefore overestimate use tax income.

Property Tax

The Project assets would be subject to property tax according to the rates determined for renewable energy generating and transmission facilities. Property taxes are based on full cash value, which is equal to 20 percent of the value of the asset (improvement cost less accumulated depreciation). The full cash value is in turn multiplied by the assessment ratio of 20 percent to derive the net assessed value. The net assessed value is subject to the average Mohave County mill rate of $8.57 per $1,000 of net assessed value (Guin 2011). So for every $1 million of Project asset value, the total property tax is estimated at approximately $343 annually.

Exemptions and Limitations

The TPT and Use Rate is levied on all construction projects; however, contractors receive a deduction that allows only 65 percent of the total costs of construction projects to be taxed (State of Arizona 2009b; Arizona Department of Revenue 2011). Other non-taxable construction expenditures include expenditures on professional services. The State of Arizona does not typically tax professional services; however, this depends on how the prime contractor structures their professional service contracts (Heugly 2011).

Under Arizona Revised Statute (A.R.S.) Title 42-5061, Arizona tax law stipulates that sales of solar energy devices shall be excluded from TPT and use tax. Solar energy devices are defined under A.R.S. Title 42-5001 as a system or series of mechanisms to produce electric power including wind generating systems (Comanita 2011). For the purposes of this analysis, use taxes associated with the purchase of wind turbines and towers and labor for their erection have been excluded from the taxable value.

4.10.1.4 Other Effects: Property Value and Quality of Life

Other effects on socioeconomic resources, specifically, property value and environmental and natural resources with socioeconomic value, are evaluated based on the conclusions from other resource sections. These sections include: climate and air quality, water resources, cultural resources, wildlife, special status species, land use, transportation and access, recreation, and visual resources.

4.10.2 Alternative A – Proposed Action

This section describes the expected effect on socioeconomic resources during construction, operations and maintenance, and decommissioning for Alternative A. Three primary types of effects are evaluated: employment and income, population and housing, property value, and other quality of life effects.

4.10.2.1 Employment and Income

The primary socioeconomic effect of Project construction would be to increase income and employment in Mohave County. As described in the Land Use Section 4.8, economic activities in the Project Area are limited to some recreational use and the short-term livestock grazing that may be displaced due to Project construction. Construction of the Project would result in potential temporary reduction of forage availability in Big Ranch Units A and B (including 797 acres for new access roads), while operation of the Project would result in potential long-term reduction of 317 acres of forage production through the life of the Project. Data from the BLM indicate that there is an average of 0.057 AUM per acre of Arizona BLM grazing lands, with a rental value of $1.35 per AUM (BLM 2010)[3]. Using these averages, the average value per 1,000 acres of grazing land is estimated at approximately $75 per month. If the total grazing area is reduced by 317 acres, the rancher would potentially lose the income from the value of approximately 20 AUMs (317x .057 AUM) every year for the life of the Project if other grazing lands cannot be secured. Therefore, the social and economic effects on livestock grazing during the life of the Project are anticipated to be negligible.

Likewise, little to no adverse effect on recreation visitor spending (hotels, restaurants, etc.) in the Mohave County economy is anticipated as most of the recreation in affected areas (southern portion of the Lake Mead NRA and the Project Area) is expected to be by local residents rather than non-resident visitors. Furthermore, the total number of affected recreationists in this area is expected to be limited in number to hundreds of users annually (rather than thousands), so the potential effects are also limited (Holland 2010, Marceau 2010). It is also feasible that the Project facilities may attract additional recreational visitors to the area, which would result in a positive effect on visitor spending in the area.

Therefore, this section focuses on the employment and income impacts that would stem from the increased economic activity associated with Project construction and operation (little to no information is available regarding Project decommissioning). This section analyzes the expected employment and income effects of the development of the wind farm itself, but due to a lack of information, does not analyze the effects of transmission line interconnection, collector lines, or substation construction or operation. Additional employment and income would be generated from these Project components, but would likely be very small compared to the costs of the wind farm construction and operation.

Project Total

As described in more detail below, Project-related expenditures for Project construction and operations are anticipated to support additional jobs and income in Mohave County. Project-related economic activity during the 12- to 18-month construction period (assuming a 500 MW Project) is estimated to support 725 jobs and $35.6 million of income in Mohave County, of which 440 jobs and $17.3 million are estimated to accrue to local residents. During the 30-year operations period, approximately 50 jobs would support an additional $2.6 million in household income. This compares to the nearly 76,000 existing jobs in the county and total annual income of $4.85 billion. The present value of total local income effects due

[3] In Arizona, there are 11.5 million acres of BLM public lands open to grazing with 659,990 active AUMs or 0.057 AUM per grazing acre.

to operations over the 30-year life of the Project is anticipated to be approximately $68.6 million, using a 3 percent discount rate. Present value represents the value of a one-time payment today that is equivalent to the 30-year stream of annual income benefits from the Project.

Employment and income impacts presented in Table 4-21 represent estimated impacts derived from a 500 MW Project. If the Project is 425 MW, a 15 percent reduction in Project size, then the employment and income impacts would similarly decrease by approximately 15 percent.

Table 4-21 Alternative A Estimated Employment and Income Impacts in Mohave County (500 MW Project)

	Local Employment (Full and Part-Time Jobs)		Local Income[1] (Millions $)		
Effect	Construction (One Year)	Operations (Annual for 30 Years)	Construction (One Year)	Operations (Annual for 30 Years)	Construction and Operation Present Value
Direct	60	30	$2.9	$1.9	$40.5
Indirect	290	5	$11.1	$0.2	$15.1
Induced	90	15	$3.3	$0.5	$13.0
Total Effects	440	50	$17.3	$2.6	$68.6

[1] Labor income reported includes the value of employee benefits

Construction

Construction of Alternative A would result in hiring of local and non-local construction workers, as well as expenditures for other local goods and services for the Project. Construction of the Project is projected to occur over a 12- to 18-month period and directly employ 90 to 500 during peak construction, with an average of 300 workers onsite daily. Of these workers, approximately 60 employees are expected to be current county residents. As noted above, it is anticipated that much of the labor to construct the Project is specialized, and would be sourced from outside the county, including from the Las Vegas metropolitan area and from other areas around the country. The remaining construction workers are anticipated to be temporary residents that would only reside in the county during construction of the Project. Total income for all construction workers is estimated at $21.2 million, of which an estimated $2.9 million is for local workers (those currently residing in Mohave County rather than Nevada residents or temporary workers relocating to the county only for the duration of the Project).

Additional local jobs would be supported by Project-related expenditures on goods and materials such as construction materials and supplies (known as indirect effects). As previously described, data from the JEDI model was used to estimate expenditures on local goods and services used as inputs to the construction process. It is estimated that this spending in the Mohave County economy for Project inputs would support 290 jobs and $11.1 million in income, primarily in the construction and services sectors.

Employment would be generated in other sectors of the Mohave County economy through spending by employees supported directly or indirectly by Project construction (known as induced effects). Non-local construction workers would spend money in the county on such goods and services as lodging, food, and gas, which results in increased employment and income in these sectors. Increased spending by local construction worker households is also expected to generate additional employment in the county. This increased spending by workers directly and indirectly supporting Project construction is anticipated to generate an additional 90 jobs (Table 4-22) and $3.3 million in income. The majority of this employment and income is anticipated to be in service sectors.

Table 4-22 Alternative A Construction Employment and Income (500 MW Project)

Economic Impact	Local Employment	Local Income[1] (Annual)
Direct Effects	60	$2,860,000
Indirect Effects	290	$11,120,000
Induced Effects	90	$3,280,000
Total Effects	440	$17,260,000

[1] Labor income reported includes the value of employee benefits

In summary, Project-related economic activity during construction is estimated to support 725 jobs and $35.6 million in Mohave County, of which 440 jobs and $17.3 million are estimated to accrue to local residents.

The construction related impacts provided in Table 4-4 above assume that the entire Project is built in one construction interval. In the event that construction occurs in two or more intervals as power purchase agreements are secured, the economies of scale assumed in deriving employment and income benefits above would likely not be achieved and therefore overall Project costs would increase. Additional construction intervals would likely increase construction costs and would ultimately increase employment and income benefits related to Project construction.

Operations

It is anticipated that the Project operations and maintenance would begin immediately following construction and would continue over a 30-year period. Employment figures represent both full- and part-time jobs. The operations and maintenance process for the Project primarily includes turbine maintenance and ROW maintenance and the associated labor, materials and utilities necessary to fulfill these functions. It is assumed that operations and maintenance would be conducted by employees hired locally, or employees that would re-locate and settle locally in the county.

During Project operations, an estimated 30 workers would be employed to maintain and operate the wind turbines, with total income to these employees of $1.9 million. In addition to jobs being directly generated by Project operations, the purchase of Project-related materials and services would also indirectly generate local employment. The JEDI model provided that expected expenditures for local goods and services totaled $0.6 million. These expenditures are anticipated to support approximately five jobs in the county, with associated income of $0.2 million.

Finally, expenditures of wages by Project employees and supporting industry employees in the local economy also support local employment. By retaining the laborers in the local area, and providing these individuals with jobs, it is expected that the additional expenditures would support an additional 15 jobs and income of $0.5 million. Thus, total employment and income supported by Project operations, including direct, indirect and induced effects, is estimated to be 50 jobs and $2.6 million in income annually (see Table 4-23).

Table 4-23 Alternative A Operations and Maintenance Employment and Income Impacts, 500 MW Project

Economic Impact	Operations Employment (Full and Part-Time Jobs)	Operations Income[1] (Annual) (Millions $)
Direct Effects	30	$1.9
Indirect Effects	5	$0.2
Induced Effects	15	$0.5
Total Effects	50	$2.6

[1] Labor income reported includes the value of employee benefits.

Decommissioning

The Project is anticipated to have a life of 30 years, at which point decommissioning would commence. Decommissioning would require labor to remove the wind turbines, electrical system, structural foundations, and roads. In addition, labor would be required to re-grade, recontour, and revegetate areas to be restored. Very little data are available regarding the employment and income effects of the decommissioning process. However, it is anticipated that the local labor and income effects would be relatively minor as the decommissioning period is temporary, and it is expected that either the operations team would provide the majority of the labor or that the process would require specialized labor from outside of Mohave County.

4.10.2.2 Fiscal Effects

This section presents the anticipated fiscal impacts from Alternative A for construction and operations (few data are available for decommissioning). The present value of property, TPT, use, and income taxes from Alternative A are estimated at $22.6 million, using a 3 percent discount rate over the 30-year life of the Project. The State of Arizona is estimated to receive the majority of these tax receipts ($13.7 million), with the county estimated to receive $7.2 million (primarily from property tax revenue), and city governments within the county are estimated to receive $1.7 million during this 30-year timeframe.

Construction

Total tax revenue in Arizona from Project construction is estimated at approximately $11.1 million, primarily in TPT and use tax accruing to the State. Mohave County is anticipated to receive approximately $366,000 over the construction period, while local purchases of goods and labor is anticipated to generate nearly $900,000 in tax revenue for cities within the county (Table 4-24).

Table 4-24 Alternative A, Fiscal Impacts from Construction, 500 MW Project

Tax Type	Expenditures Subject to Taxes	Proportion Taxable[1]	Taxable Value	Tax Rate	Tax Revenue
Arizona					
Personal Income Tax	$21,240,000	80%	$16,893,000	1.1%	$186,000
Transaction Privilege Tax (TPT)	$69,070,000	65%	$44,895,500	6.6%	$2,963,000
Use Tax	$156,150,000	65%	$101,497,500	6.6%t	$6,699,000
Subtotal					$9,853,000
Mohave County					
TPT	$69,070,000	65%	$44,895,500	0.25%	$112,000
Use Tax	$156,150,000	65%	$101,497,500	0.25%	$254,000
Subtotal					$366,000
Cities within Mohave County					
TPT	$69,070,000	65%	$44,895,500	2%	$898,000
Subtotal					$898,000
Total Tax Revenue					$11,112,000

[1] Approximately 80 percent of employee compensation is subject to personal income tax, as approximately 20 percent is estimated to be employee benefits that are not subject to this tax. Also, per Arizona law, only 65 percent of contractor construction costs are subject to TPT and use tax.

Operations

In all, total tax revenue resulting from Project operations is estimated at approximately $587,000 annually, with the majority accruing to jurisdictions in Mohave County as property tax. The anticipated annual tax revenue for the State as a result of operations is approximately $197,000. At current tax rates, tax revenues to Mohave County and its municipalities are estimated at $350,000, nearly all of which is in property taxes (Table 4-25).

Table 4-25 Fiscal Impacts from Operation of Alternative A, 500 MW Project

Tax Type	Expenditures Subject to Taxes	Proportion Taxable	Taxable Value	Tax Rate	Tax Revenue
Arizona					
Income Tax	$1,922,231	80%	$1,529,000	1.1%	$17,000
Transaction Privilege Tax (TPT)	$2,000,000	100%	$2,000,000	6.6%	$132,000
Use Tax	$720,000	100%	$720,000	6.6%	$48,000
Subtotal					$197,000
Mohave County					
TPT	$2,000,000	100%	$2,000,000	0.25%	$5,000
Use Tax	$720,000	10.%	$720,000	0.25%	$2,000
Property Tax (mill rate)	$999,850,000	4%	$39,994,000	.00857%	$343,000
Subtotal					$350,000
Cities within Mohave County					
TPT	$2,000,000	100%	$2,000,000	2%	$40,000
Subtotal					$40,000
Total Tax Revenue					$587,000

Decommissioning

Little data are available on the decommissioning period, though there would be some income tax generated by decommissioning labor. It is also likely that some transaction privilege tax or use tax would be levied on construction services or materials purchased for decommissioning.

4.10.2.3 Population and Housing Effects

This section provides analysis on the impacts of the Project on the Mohave County population and housing market expected to result from the additional temporary and permanent (for the life of the Project) workforce population needed for construction, operation, and decommissioning of the Project. No other population or housing effects are expected from the Project. Throughout the life of the Project, the projected workforce needed for Project construction and operations would be a small percentage of the total county population (over 200,000 people) and available vacant housing.

In terms of housing, Mohave County has approximately 28,000 vacant units county-wide, of which approximately 9,000 units are located in the cities and communities closest to the Project Area for which data are available: White Hills Census Designated Place (CDP), Dolan Springs CDP, Meadview CDP, Bullhead City, and Kingman. Roughly one-third of these units, or approximately 3,160 units, are available for rent. White Hills is the nearest community to the Project Area, but has only 7 units available for rent. Similarly Meadview CDP has few vacant units available for rent. However, Dolan Springs CDP has a vacancy rate of approximately 30 percent, or 400 units, of which approximately 50 are vacant rental units. There are an additional 2,700 vacant units available for rent and 4,100 housing units for sale in Bullhead City. Kingman, another city proximate to the construction site, has a total vacancy rate of 8.1 percent, with approximately 400 rental units available and 600 housing units for sale. An additional 7,000 housing units are located nearby in Boulder City in Clark County, Nevada, of which approximately 660 are vacant rental units and 150 are vacant units for sale.

Table 4-26 Vacancy Rates and Units Available for Sale and Rent in the Area of Analysis1

Geographic Area	Total Housing Units[1]	Vacancy Rate (percent)		Units Available	
		Rental	Homeowner	For Rent	For Sale
Bullhead City, AZ	23,254	11.6	17.4	2,710	4,065
White Hills CDP, AZ	290	14.3	15.1	7	22
Dolan Springs CDP, AZ	1,311	3.6	26.7	48	351
Meadview CDP, AZ	1,373	6.1	11.2	4	75
Kingman, AZ	12,235	3.2	4.9	386	604
Boulder City, NV	6,979	9.5	2.1	663	146
Project Region Subtotal	*45,442*	*9%*	*12%*	*3,818*	*5,263*
State of Arizona	13,530,719	6.5	8.8	173,168	236,212

SOURCE: U.S. Census Bureau 2010 (Census 2010a)

[1] Vacancy rates and units available represent reporting by the U.S. Census Bureau for 2010. Actual rates and units will vary over time and season.

Construction

Project construction is estimated to span over a 12- to 18-month period, with approximately 90 to 500 during peak construction, with an average of 300 workers onsite daily. As up to 60 of these workers are expected to be local residents, the maximum population increase at any one time in Mohave County directly due to Project construction is estimated at approximately 240 people. This is approximately 0.1 percent of the Mohave County population. As noted above, in addition to the directly employed labor force, Project construction is anticipated to support an additional 380 jobs (indirect and induced effects). There may be additional people relocating to the county during Project construction to fill these jobs, but as this employment is generally not specialized and as there is relatively high existing unemployment in the local area, it is expected that most of these jobs supported by the Project would be filled by local residents.

Given the available, vacant housing supply of 3,800 housing units for rent in the county, there is a sufficient supply of housing in existence in the area to accommodate any temporary construction workers.

While housing choice by construction worker depends on the type and quality as well as the quantity of available housing, it is expected that with the diversity of choice available in the larger communities proximate to the Project Area that Project-related housing demand would be met by the existing housing supply. Therefore, no new housing is expected to be constructed as a result of the Project. The increased demand for short-term housing from Project construction workers may exert very localized (such as in Dolan Springs CDP) upward pressure on rental market pricing; however, given the high supply of vacant rental units in the county compared to the potential housing demand from Project construction workers, little effect on housing market prices is expected.

Operations

During operations, the Project would employ an estimated 30 workers and support an additional 20 jobs. Long-term population impacts on the county would be less than 50 people, for which there are adequate available, vacant housing units. Therefore, no new housing is expected to be constructed as a result of the Project and little to no effect on housing prices is expected.

Decommissioning

During decommissioning, it is not known how many employees the Project would directly or indirectly support. However, it is expected that the effects would be less than in the Project construction in which the population increase is estimated to be less than 0.1 percent of the population. No new housing is expected to be constructed as a result of Project decommissioning, and little to no effect on housing prices is expected.

Visual Impacts and Property Value Effects

Private property values can vary based on the scenic quality of the surrounding landscape. As wind farm developments affect the visual resources in an area, it is possible that such developments could affect property values. However, as described in the visual resources section, there is limited visibility of Project turbines from residential areas in the White Hills Community, Dolan Springs, and Meadview areas. From a few homes located on Indian Peak Road (directly south of the Wind Farm Site), some turbines may be visible (see Visual Resources Section 4.12). Noise can also affect property values, but as discussed in the Noise section (4.15), known residential uses in proximity to wind turbines are not expected to experience construction or operation noise impacts on the basis of Project noise levels complying with Mohave County Zoning Ordinance limits. However, if a threshold of 45 dBA Ldn outdoors is applied as an impact indicator at residential receivers, a portion of the nearby potential residential land use may, under specific wind conditions, experience a noise impact from the operation of wind turbines.

For the homes that have views of the Project Area or may experience noise impacts, property value impacts may occur, but are not expected. Numerous economic studies have analyzed the effect of wind farm development on private property values, and most have found that there is no statistical relationship between property values and proximity to wind farms. For example, a 2009 review of data on 7,500 sales of single-family homes located within 10 miles of 24 existing wind facilities in 9 US states found that there is no consistent, statistically significant effect on home sale prices with a view of wind facilities or proximity to wind facilities (Lawrence Berkeley National Laboratory 2009). While there may temporarily be added traffic, dust, and water use, and sediment in washes in the Project Area, particularly during construction (see below), these effects are not expected to affect property values due to their temporary (during construction) or minor nature.

Construction

Although the Project construction may temporarily adversely affect residents through noise, dust, and increased traffic, as discussed under Visual Impacts and Property Values, Alternative A is not expected to affect private property values in the study area.

Operations

As discussed under Visual Impacts and Property Values, Alternative A is not expected to affect private property values in the study area.

Decommissioning

As discussed under Visual Impacts and Property Values, Alternative A is not expected to affect private property values in the study area.

Other Quality of Life Effects

Quality of life of residents in the area may be affected by changes in traffic density and changes in natural resources or environmental quality, including air quality, water quality/quantity, wildlife habitat, and prevalence of invasive species. In general, these types of impacts would be concentrated during the temporary construction and decommissioning periods, but are expected to be of small magnitude throughout the life of the Project (as described elsewhere in this chapter).

Construction and Decommissioning

During the construction and decommissioning of the Project, some temporary adverse effects on quality of life for local residents may result due to increased Project-related traffic, and potential effects on air quality, water quality, habitat, and potential increased prevalence of invasive species. Increased traffic on existing roads may result, including US 93 and possibly the White Hills Access Road (if construction crews use it to access the site), potentially increasing travel time and travel hazards for local residents. Construction and decommissioning-related emissions and dust may also reduce air quality in the Project Area by emissions of PM_{10} (particulate matter that is 10 micrometers or less in size). PM_{10} can reduce visibility and negatively affect health. The potential adverse consequences of these effects vary significantly by location based on the existing air quality conditions, the local population, and other factors. It is expected that these impacts may be relatively low in the area due to the existing good air quality and low population density.

As discussed in the Water Resources Section 4.4, total pumping withdrawals for dust control and concrete production represent approximately 0.03 percent of recoverable groundwater. This small percentage of depletion is unlikely to affect the overall groundwater supply, especially given the low groundwater use in Detrital Valley. Furthermore, construction and decommissioning activity may also cause a temporary adverse effect on water quality in downstream drainages. If this affects water clarity in areas with high visibility (such as recreation areas, or areas adjacent to residential areas) or affects the quality of aquatic habitat, then adverse temporary, and likely minor, economic effects may result. Similarly, as discussed in the Biological Resources section, habitat areas disturbed by Project construction may be more susceptible to invasive species that may have potential costs to landowners or public agencies.

Local residents and visitors that recreate in the Project Area may be affected by Project construction. The Project may potentially affect the value of the recreation experience for visitors and residents due to: (1) potentially reduced hunting opportunities from fewer deer occurring in the area during construction and decommissioning, (2) visibility of wind turbines to recreationists in the backcountry, southern portion of the Lake Mead NRA and to recreationists in and near the Project Area such as OHV users, and hunters (potential positive or adverse effects), and (3) potential change in size/quality of OHV-designated roads and trails in the Project Area. The effect on recreationists is expected to be limited as recreation use in the southern portion of the Lake Mead NRA and the Project Area is estimated to be relatively low (in the hundreds of visitors annually [Marceau 2010; Holland 2010]).

Finally, as indicated in the Cultural Resources Section 4.6, impacts on cultural resources from Project activities are expected to be limited, resulting in no related socioeconomic effects.

Operations and Maintenance

The type of expected effects on quality of life of local residents would be similar to effects in the construction and decommissioning periods, but would be smaller in magnitude due to reduced activity on the Project Area (and associated lower emissions and traffic). Effects on habitat and recreation would likewise be smaller as less area would be disturbed by Project-related operations activity compared to construction activity.

4.10.3 Alternative B

The types of socioeconomic effects from Alternative B are similar to Alternative A. As employment and income from a wind power project typically vary based on the MW of capacity rather than the number of turbines or turbine size, Alternative B is anticipated to support the same number of jobs and income as Alternative A. Similarly, effects on population and housing would be expected to be the same as in Alternative A. Similar to Alternative A, some minor adverse impacts to quality of life, particularly during the temporary construction and decommissioning periods, may occur due to effects of Alternative B on air quality, water quality and quantity, recreation, and wildlife and habitat. These impacts are expected to be smaller than in Alternative A due to the reduction in the number of wind turbines and overall size of the Project footprint. Property value impacts are not anticipated under Alternative A, but are even less likely under Alternative B due to increased distance to turbines from the Indian Peak Drive residential areas and private lands to the east of the Wind Farm Site.

4.10.4 Alternative C

The socioeconomic effects from Alternative C are similar to Alternative B, with the same number of turbines potentially developed in both Alternatives (i.e., the same number of jobs and income as Alternative A, with reduced potential impacts other socioeconomic and quality of life measures). The primary difference between Alternative B and C is that Alternative C provides even greater separation between private lands and turbines. Although little to no impacts are expected on property values and small to negligible impacts are expected on quality of life under Alternative A or Alternative B, this increased separation would reduce further any quality of life or potential private property value impacts of Project development.

4.10.5 Alternative D – No Action

It is anticipated that under the No Action Alternative, socioeconomic resources in Mohave County would continue along current trend lines. These include population, and employment growth rates higher than the Arizona and the U.S. average rates; but relatively high housing vacancy rates and unemployment rates. Other quality of life factors, such as air quality, water quality, scenic vistas, recreation opportunities, and local traffic are also expected to continue similar to current conditions.

4.10.6 Alternative E – Agencies' Preferred Alternative

The socioeconomic effects from Alternative E would be similar to the other action alternatives because approximately the same number of jobs, income, and tax revenues would be generated. Similar to

Alternative A, some minor adverse impacts to quality of life, particularly during the temporary construction and decommissioning periods, may occur due to effects of Alternative E on air quality, water quality and quantity, recreation, and wildlife and habitat. These impacts are expected to be smaller than with Alternative A due to the reduction in the number of wind turbines and overall size of the Project footprint. Property value impacts are not anticipated with Alternative A and would be comparable to Alternative E if all phases of Alternative E are needed to satisfy the nameplate generation requirements. If some of the phases are not needed and turbines are not constructed in all or portions of the southernmost corridor, the increased distance between turbines and residential and private lands to the south would further mitigate concerns that potential visual and noise effects of the turbines could degrade property values.

4.10.7 Mitigation Measures

Compared to the No Action Alternative, the primary socioeconomic effects of the action alternatives would be to increase income, employment, and tax revenue in Mohave County. The expected increase in income, employment, and tax revenue is the same under all action alternatives. Current economic activities in the Project Area are limited to some recreational use and short-term livestock grazing that may be displaced due to Project construction, with negligible adverse effects on local employment and income. Project-related employment and income is largest under the 12- to 18-month construction period, with smaller income and employment effects during operations. Employment and income effects from decommissioning are expected to be smaller than during construction but potentially larger than under operations. Minor to no effects are expected on property values, population, water quantity, or housing due to the action alternatives. Small adverse effects to quality of life, particularly during the temporary construction and decommissioning periods, may result from effects on traffic, air quality, water quality, and recreation. Such adverse effects would be approximately 26 percent smaller in Alternatives B, C and E than under Alternative A due to the smaller Project size and modified configuration to increase the distance to private property.

No mitigation measures are needed for social and economic conditions because income employment and tax revenue impacts are expected to be positive. The impacts in connection with activities such as grazing, and effects on property values, population, water quantity or housing would be minimal and no mitigation measures are expected.

4.11 ENVIRONMENTAL JUSTICE

This section presents the potential environmental justice effects of the proposed action alternatives and the No Action Alternative. The key socioeconomic parameters considered in the analysis are race/ethnicity and measures of social and economic well-being, including health, quality of life, per capita income, median household income, and poverty rates. The analysis area considered for environmental justice is presented in detail in Section 3.11.1.1. The data used for this analysis of environmental justice effects, as presented in detail in Section 3.11, are from the most recent available or published data from reliable sources.

4.11.1 Analysis Methods

4.11.1.1 Levels of Analysis

The geographic scope of the analysis focuses on the Census Block Group and County in which the Project Area is located, in comparison to Mohave County and the State of Arizona. The locations of these geographic units are presented in Figures 3-6(a) and 3-6(b) in Section 3.11. As discussed in more detail in Section 3.11.1, the geographic boundaries and divisions of Census Tracts and Block Groups are modified in Census 2010 (see Figure 3-6(b)) compared to Census 2000 (see Figure 3-6(a)). Also, economic data, such as poverty status, per capita income, and median household income, are now only collected through the American Community Survey and are no longer collected in the census. The latest available American Community Survey data are 2005-2009 5-Year Estimates, which are provided for the Census 2000 geographic unit boundaries (the Project would be located in Census Tract 9504, Block Group 2). Therefore, analysis of lower income populations is carried out using slightly different geographic boundaries and data source (see Table 3-21 with data for Census Tract 9504, Block Group 2), while data for identifying populations of minorities is analyzed based on 2010 Census boundaries and data (see Table 3-22 with Census Tract 9504, Block Group 3). More details on the variation in these levels of analysis for minority populations and lower-income populations are provided in the relevant portions of the discussion that follows.

4.11.1.2 Environmental Justice Effects Methodology

As required by Executive Order 12898, environmental justice effects are identified and characterized based on whether low-income and/or minority populations reside within the area of analysis and, if present, whether disproportionately high and adverse human health, environmental, and/or social and economic effects of the proposed action alternatives are anticipated for these populations (relative to total population effects). Following the discussion of existing conditions in Section 3.11, this analysis assesses the magnitude of changes that may occur as a result of the Project in relevant socioeconomic variables and whether these may particularly affect a minority or low-income population. In addition, as per the analysis and conclusion in Section 4.10, this section also considers any other effects on the human environment that could potentially adversely and disproportionately affect the quality of life or health of these groups.

Based on the Federal guidance and professional judgment, the following criteria are used to evaluate potential effects to low income and minority populations:

- Are there any potential adverse socioeconomic, environmental, and human health effects associated with the alternatives?
- Are minorities or low-income communities disproportionately subject to these adverse effects?

Three categories of economic effects are analyzed following the implementation of these actions: employment and income; population and housing; and fiscal. Categories of effects considered that could affect the quality of life or human health include: climate and air quality; transportation and access; recreation; and visual resources. The quality of life effects on minorities or low-income communities are analyzed at the local level given that climate and air quality-, visual-, traffic-, and recreation-related effects of the Project are anticipated to primarily affect communities located in the vicinity of the Project in Census Tract 9504.

4.11.2 Alternative A– Proposed Action

This section analyzes the potential effects of the construction, operation, and decommissioning of these facilities on minorities and low-income communities.

4.11.2.1 Construction

The following discussion analyzes the potential environmental justice effects of Project construction on minority and low-income groups.

Effects on Minority Groups

As per the Census 2010 geographic unit boundaries, the Project is located in Census Tract 9504.02, Block Group 3, which is the largest Block Group (in terms of acreage) in Mohave County. Mohave County is almost 87 percent White, with lower proportions of Black, Asian, Hispanic and Latino, and Native Hawaiian or Other Pacific Islander (NHOPI) populations than the State or the Nation (Figure 3-3). The proportion of American Indian-Alaskan Native (AIAN) population in the County is lower than that in the State, but higher than the Nation. Compared to the County, Census Tract 9504.02, Block Group 3 has lower proportions of all racial and ethnic groups. Analyzing at the Census Tract-level, Census Tract 9504.02 has a larger proportion of AIAN (3.5 percent) relative to Mohave County, but still lower than the State. At the smaller geographic level of Block Group, the smaller proportions of minorities in Census Tract 9504.02, Block Group 3 do not constitute a concentration of these groups adjacent to the Project Area. Therefore, the analysis does not identify minority populations on which Alternative A may potentially have disproportionately high and adverse effects during construction. Similarly, building the Project in two or more construction intervals could extend the duration of construction activities but would not have disproportionately high and adverse effects on minority populations.

Effects on Low-Income Communities

The economic effects on low-income communities are analyzed at both the County and local levels. As stated earlier, the latest available American Community Survey data are 2005-2009 5-Year Estimates, which are provided for the Census 2000 geographic unit boundaries (in which the Project is located in Census Tract 9504, Block Group 2) (Census 2010b). Based on these estimates, Mohave County has lower per capita and median household incomes compared to Arizona and the United States, and a higher poverty rate compared to the State and the Nation. Analyzing at the smaller geographic levels, the smallest geographic unit for which 2005-2009 American Community Survey data are available is Census Tract. As shown in Table 3-21, the poverty rate in Census Tract 9504, where the Project would be located, is 18.2 percent higher than that in Mohave County, while the per capita income and median household income estimates in the Census Tract are slightly lower than those for the County.

While more recent economic data are not available at the Block Group-level yet, based on older Census 2000 data, in Census Tract 9504, Block Group 2, where the proposed Project would be physically located, both the per capita and median household incomes are lower than the County, while the poverty rate is 70.4 percent higher than the County.

As stated earlier and illustrated in Figures 3-6(a) and 3-6(b) in Section 3.11, both the Census Tract and Block Group in which the Project would be physically located are large in terms of area relative to the Project footprint. While not enough information is available to identify if low-income populations are located directly adjacent to the Project, the data shows that Census Tract 9504, Block Group 2 has a disproportionately high low-income population relative to the County.

As presented in Section 4.10.2, the socioeconomics analysis of potential impacts from the Project has identified increases in jobs, income, and tax revenues in Mohave County, which would have a positive effect on all populations, including low-income and minority populations, and, therefore, positive environmental justice effects. Furthermore, no new housing is expected to be constructed as a result of Alternative A, and no more than a minor effect on housing market prices is anticipated; consequently, no environmental justice effects are expected related to housing.

The quality of life impacts related to air and water quality, visual resources, traffic, and recreation are expected to be concentrated on the population residing in areas immediately adjacent to the Project Area within Census Tract 9504, Block Group 3. As presented in Section 4.10.2, there may be adverse impacts on the quality of life (from potential impacts to water quality, recreation, traffic, and visual resources) and human health (from potential impacts to air quality), particularly during the temporary construction period of Alternative A. As stated in the preceding discussion, not enough information is available to identify if low-income populations are located directly adjacent to the Project. However, as the Block Group has a disproportionately high low-income population, it is expected that there may be minor adverse impacts that disproportionately affect low-income populations in the Project Area, resulting in a potential minor environmental justice effect. Similarly, building the Project in construction intervals which could extend the duration of construction activities and potentially emissions, there could be a minor adverse effect on low-income populations in the Project Area. The increase would be in relation to a potential increase in the duration of construction, but as there would be no increase in the extent of surface disturbance, construction methods or number of turbines, the effects on quality of life would be the same previously described.

4.11.2.2 Operations and Maintenance

Similar to construction, since the smaller proportions of minority populations in the area do not constitute a disproportionate concentration of these groups, the analysis does not identify minority populations on which the operations and maintenance of the facilities under Alternative A may potentially have disproportionately high and adverse effects.

The environmental justice effects on low-income communities related to the operations and maintenance of facilities under Alternative A are similar to those identified under construction, with positive employment and income effects and potentially adverse quality of life impacts related to environmental quality and some recreation uses. However, the job creation- and income-related effects would be of a long-term due to the 30-year life of the Project. Further, potential adverse quality of life effects would be smaller in magnitude compared to the construction period given the reduced activity around the Project Area (and the associated lower air emissions and traffic).

4.11.2.3 Decommissioning

Similar to construction, since the smaller proportions of minority populations currently in the Project area do not constitute a disproportionate concentration of these groups, the analysis does not identify minority populations on which the operations and maintenance of the facilities under Alternative A may potentially have disproportionately high and adverse effects. The population statistics may differ in approximately 30 years when decommissioning is projected to occur, but the nature of the potential changes in the population cannot be anticipated.

The environmental justice effects on low-income communities during the decommissioning of the Project under Alternative A are similar to those identified under construction above. However, the job creation- and income-related effects would be relatively minor given that the decommissioning period is temporary, and it is anticipated that either the operations team would provide the majority of the labor or that the process would require specialized labor outside of Mohave County.

4.11.3 Alternative B

This section analyzes the potential effects of the construction, operations and maintenance, and decommissioning of these facilities under Alternative B on minorities and low-income communities.

4.11.3.1 Construction

It is anticipated that the environmental justice effects stemming from the construction of facilities under Alternative B would be similar to those for Alternative A as described in Section 4.11.2. However, the potential environmental justice effects related to environmental quality would be slightly reduced given the approximately 25 percent reduction in the maximum number of turbines supported and reduced road mileage constructed, although the positive effects on jobs and income are anticipated to be the same as under Alternative A.

4.11.3.2 Operations and Maintenance

It is anticipated that the environmental justice effects stemming from the operations and maintenance of the Project under Alternative B would be similar to those for Alternative A as described in Section 4.11.2, with positive employment and income effects and potentially adverse quality of life impacts related to environmental quality and recreation. However, the potential adverse environmental justice effects related to environmental quality would be slightly reduced given the approximately 25 percent reduction in the maximum number of turbines supported, although the positive effects on jobs and income is anticipated to be the same as under Alternative A.

4.11.3.3 Decommissioning

It is anticipated that the environmental justice effects stemming from the decommissioning of facilities under Alternative B would be similar to those for Alternative A as described in Section 4.11.2. However, the potential environmental justice effects related to environmental quality would be slightly reduced given the approximately 25 percent reduction in the maximum number of turbines supported, although the positive effects on jobs and income is anticipated to be the same as under Alternative A.

4.11.4 Alternative C

This section analyzes the potential effects of the construction, operations and maintenance, and decommissioning of these facilities under Alternative C on minorities and low-income communities.

4.11.4.1 Construction

It is anticipated that the environmental justice effects stemming from the construction of facilities under Alternative C would be similar to those for Alternative A as described in Section 4.11.2, with positive employment and income effects and potentially adverse quality of life impacts related to environmental quality and recreation. However, the potential adverse environmental justice effects related to environmental quality would be slightly reduced given the approximately 25 percent reduction in the maximum number of turbines supported, although the effects on jobs and income is anticipated to be the same as under Alternative A. Further, given the greater distance of the Project from private property under this Alternative, potentially fewer quality of life and potential property value impacts are anticipated relative to Alternative B.

4.11.4.2 Operations and Maintenance

It is anticipated that the environmental justice effects stemming from the operations and maintenance of the Project under Alternative C would be similar to those for Alternative A as described in Section 4.11.2, with positive employment and income effects and potentially adverse quality of life impacts related to environmental quality and recreation. However, the potential environmental justice effects related to environmental quality would be slightly reduced given the approximately 25 percent reduction in the maximum number of turbines supported, although the effects on jobs and income is anticipated to be the same as under Alternative A. Further, given the greater distance of the Project from private property under this Alternative, potentially fewer quality of life and potential property value impacts are anticipated relative to Alternative B.

4.11.4.3 Decommissioning

It is anticipated that the environmental justice effects stemming from the decommissioning of facilities under Alternative C would be similar to those for Alternative A as described in Section 4.11.2. However, the adverse effects would be slightly reduced given the approximately 25 percent reduction in the maximum number of turbines supported. Further, given the greater distance of the Project from private property under this alternative, potentially fewer quality of life and potential property value impacts are anticipated relative to Alternative B.

4.11.5 Alternative D – No Action

As per the discussion in Section 4.10.5, under the No Action alternative, socioeconomic resources in Mohave County would continue along current trend lines, and other quality of life factors are also anticipated to continue similar to current conditions. Therefore, there are no anticipated effects related to the Project on minority and low-income groups in the Block Groups, Census Tracts, and cities/CDPs in the vicinity of the Project Area, or in Mohave County.

4.11.6 Alternative E – Agencies' Preferred Alternative

4.11.6.1 Construction

It is anticipated that the environmental justice effects stemming from the construction of facilities under Alternative E would be similar to those for Alternative B as described in Section 4.11.3.1.

4.11.6.2 Operations and Maintenance

It is anticipated that the environmental justice effects stemming from the operations and maintenance of the Project under Alternative E would be similar to those for Alternative B as described in Section 4.11.3.2.

4.11.6.3 Decommissioning

It is anticipated that the environmental justice effects stemming from the decommissioning of facilities under Alternative E would be similar to those for Alternative B as described in Section 4.11.3.3.

4.11.7 Mitigation Measures

The analysis of environmental justice effects of the proposed action alternatives does not identify minority populations on which the Project may potentially have disproportionately high and adverse effects. Also, while not enough information is available to identify low-income communities in the Project area and its direct vicinity, Block Group- and County-level data suggest that Census Tract 9504, Block Group 2 (based on Census 2000 geographic boundaries) and Mohave County in general have larger proportions of low-income populations relative to the County and the State of Arizona, respectively. However, in general, these communities would be positively affected by the Project through the creation of both temporary and permanent (for the life of the Project) jobs, as well as income- and tax-effects. Some adverse quality of life effects would be anticipated on these communities during construction, operations, and decommissioning, but those are expected to be minor and primarily of a temporary nature. Overall, the analysis identifies minor to no environmental justice effects of the proposed action alternatives on low-income groups, and no mitigation measures are warranted.

4.12 VISUAL RESOURCES

4.12.1 Analysis Methods

This analysis evaluates potential impacts to visual resources that could result from construction, operation, and decommissioning of the Project. The analysis area for the visual resource impact assessment included all lands located within a 20-mile radius of the proposed Project (Map 4-1). According to BLM distance zones, distances greater than approximately 15 miles are considered "seldom seen." In this distance zone light and dark patterns of vegetation are not visible, and only the form or outlines of large features are discernible. For this analysis the radius was increased to 20 miles to recognize the potential of greater visibility of a Project this size with nearly 500-foot high turbines with rotating blades.

The BLM prepared visual inventory classes and management class objectives throughout its planning unit, which includes non-BLM land. The inventory classes are informational and provide a basis for considering visual values. The visual management classes provide objectives to BLM that must be considered when evaluating potential impacts on BLM-administered land. Therefore the management classes do not apply to Reclamation, state trust, and private lands, and are not used for analysis of these lands.

4.12.1.1 Indicators

Indicators used to measure potential impacts to visual resources that could result from the Project include:

- The level of visual contrast created by the Project on both BLM and Reclamation land
- Changes in Visual Resource Inventory (VRI) class, including component VRI in values (scenic quality, visual sensitivity, and distance zones) that was inventoried for both the BLM and Reclamation land
- Conformance with existing VRM objectives for only the BLM land

Additional qualitative indicators included the expected level of change to the existing landscape aesthetic, such as lighting, movement, activity (measured in terms of change in vehicular traffic and amount of people), or naturalness.

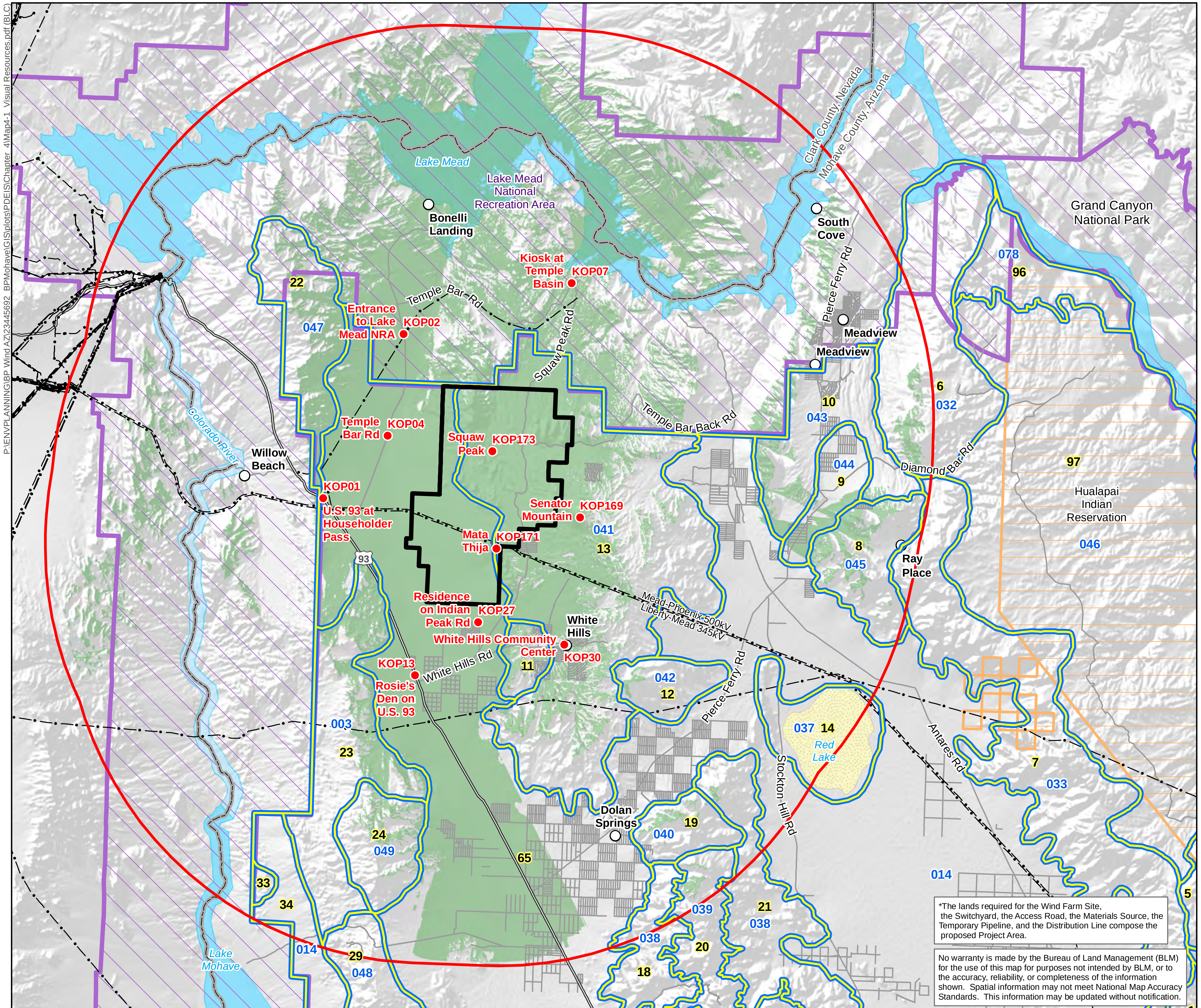
4.12.1.2 Assumptions

The following assumptions were used when analyzing effects of the Project on visual resources:

- Direct impacts are consequences that occur at the same time and place as the Project. Indirect impacts occur later in time or are farther removed from the Project, but are reasonably foreseeable.
- All potential construction-related impacts to visual resources are considered short term (5 years).
- Change in VRI values was assessed based on the combined contrast of all Project components. Expected change in VRI values was assessed only for long-term operations-related impacts.
- Conformance with VRM objectives was based on expected long-term impacts.

Map 4-1
Visual Resources

Mohave County Wind Farm Project



Legend

- Wind Farm Site*
- Key Observation Point (KOP)
- Area within Turbine Viewshed
- Sensitivity Level Rating Unit Boundary
- Scenic Quality Rating Unit Boundary
- Hualapai Indian Reservation
- National Park or Recreation Area
- 20-Mile Radius of Proposed Wind Farm Site

General Features

- Community
- Existing Transmission Line
- U.S. Highway
- Road
- River
- Lake
- Dry Lake
- State Boundary

Source:
Project Area Boundary: BPWE North America, Inc 2011
Sensitivity and Scenic Quality: BLM 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 2007-2010, ESRI 2008
Viewshed: URS 2011
Key Observation Points: URS 2009 - 2010

NATIONAL SYSTEM OF PUBLIC LANDS

N

0 2.5 5
Miles

4.12.1.3 Viewshed Analysis

A viewshed analysis using GIS was completed to identify locations where the Project theoretically could be seen, and areas where it was eclipsed by topography (Map 4-1). This analysis determines Project visibility based on the relationship between topography, height of the proposed wind turbines, and average eye height of the viewer. The resulting "seen area," or viewshed, represents the area where one or more turbines could theoretically be seen, and does not represent any measure of detectability of the turbines. The viewshed analysis was used to assess visibility of the Project, and to better understand viewer experience within the landscape. For example, roadway travelers may experience intermittent views of the Project where topography is variable, and more prolonged views where topography is flat. For the purposes of this analysis, input parameters were defined as follows: eye level of 5.5 feet, maximum turbine hub height measuring 264 feet (80 meters), and a maximum blade tip height 492 feet (150 meters). The viewshed was based on the number and configuration of turbines presented in Alternative A.

4.12.1.4 Key Observation Points (KOPs)

The analysis was conducted from ten KOPs representing common and/or sensitive views from five general areas, including: (1) Temple Bar Road; (2) the Lake Mead NRA, (3) Traditional Cultural Areas of members of the Hualapai Tribe; (4) US 93; and, (5) the residential area of White Hills and Indian Peak Road (see Map 4-1). The observation points were selected with the intention of collecting a representative sample of various viewers in the area surrounding the Project including recreational viewers (visitors to Lake Mead NRA), residential viewers (within White Hills), travelers (along US 93 or other key routes), and sensitive viewers (persons visiting wilderness). No KOPs were established in the BLM-administered Mount Wilson Wilderness Area or the NPS proposed wilderness in Lake Mead NRA. It was assumed that views from Mount Wilson and Wilson Ridge would focus on the dominant landscape features of Lake Mead and Lake Mohave to north and west, opposite of the Project location. Consideration was given to establishing a KOP within the proposed wilderness northeast of the Project Area that is administered by NPS; however, in coordination with NPS staff, it was decided that this was not required because the number of viewers would be few, and the KOPs from Lake Mead NRA would focus on the more frequently visited areas. Nevertheless, potential impacts on the existing and proposed wilderness areas are analyzed under the action alternatives.

The viewer areas differ by landscape analysis factors, such as their distance from the Project, predominant angle of observation, dominant use (i.e., recreation or travel), and duration of views (including the average travel speed at which the Project could be viewed for KOPs along roads and highways). Photos were obtained at all KOPs, and are presented in Appendix D. All KOPs were chosen from within the viewshed of the Project based on input from BLM staff, NPS staff at Lake Mead NRA, the Hualapai Tribe, and input received at Project scoping meetings. Landscape character and analysis factors for each of the five areas are summarized below. A more complete description of each KOP is provided in Appendix D.

- ***Temple Bar Road*** – The administrative boundary of the Lake Mead NRA is located on the northern boundary of the Project Area. Visitors may enter the NRA via Temple Bar Road, located approximately 5 miles west of Project. Views of the Project Area include the broad, sweeping valley formed by the Detrital Wash, and the mountain peaks of Senator Mountain, Squaw Peak, and residential areas. The landscape is described as open, panoramic and focal, with varied form, line, color, and texture. The valley landform is flat to rolling with rounded to peaked hills and mountains in the distance. The soil is smooth and light gray to reddish tan. The hills and mountains are texturally smooth to coarse with erosion channels. They appear light to dark brown with bluish hues for the most distant features. The valley vegetation includes short gray to tan grasses, rounded green, tan, brown and gray shrubs (leaves and branches), with some vertical cacti and shrub branches. Manmade features include the dark gray rolling Temple Bar Road, brown parallel vertical utility poles, the night-lighted brown rectangular park entrance station, and the gray parallel transmission towers in the distance. Views from Temple Bar Road are transient, as motorists are traveling at an average speed of 50 mph to a recreation destination. Views of the Project Area would be at an oblique angle. Visual sensitivity is assumed to be moderate (Section 3.12.4.2).

- ***Lake Mead NRA*** – For the purpose of this analysis, the Lake Mead viewer area is restricted to the portion of the lake and adjacent upland areas extending to a distance of approximately 1.5 miles from the shoreline. This area extends from "The Narrows" to Temple Basin, and includes Temple Bar, a recreation destination outfitted with parking, airstrip, marina and boat launch, lodging, campground, picnic area, and ranger station. Views to the south toward the Project Area are from an inferior (lower elevation) position, and at a distance of greater than approximately 6.5 miles. Golden Rule Peak and Senator Mountain provide some enclosure; however the landscape is large in scale, and appears open and panoramic. The landscape exhibits moderate levels of variation in form, line, color, and texture in landform. The landform is rolling with rounded to peaked hills and mountains in the distance. The soil is gray to tan with scattered dark cobbles and rocks. The hills and mountains are texturally smooth to coarse with erosion channels. They appear light to dark brown with bluish hues for the most distance features. The vegetation includes rounded green, gold, and brown shrubs (leaves and branches) that are scattered and patchy. Manmade features include the dark gray rolling and curving Temple Bar Road, the vertical communications tower on the distant Senator Mountain, and the brown vertical utility poles paralleling the road. The communications tower and utility poles are characterized by weak contrast to the surrounding landscape, and are not easily detected from this view. To characterize views experienced by recreators in the NRA, a KOP (KOP 7) was established at the NPS interpretive kiosk located on Temple Bar Road. The kiosk is located approximately 1.5 miles upland from the south shore of Lake Mead and approximately 0.5 mile west of campgrounds at Temple Bar on Lake Mead. The KOP is approximately 8 miles from the Project boundary for all action alternatives. Viewers in this portion of the NRA include recreators engaged in motorized and non-motorized land- and aquatic-based recreation. For the purpose of this analysis, all viewers situated within the NRA are assumed to have high visual sensitivity (Section 3.12.4.2).
- ***Traditional Cultural Locations of the Hualapai Tribe*** – The Project Area is within territory historically occupied by the Red Rock Band of the Hualapai Tribe. Members of the Mohave Tribe indicated they also had traditional interaction with the Red Rock Band. Traditional cultural resources have been identified at Senator Mountain, Squaw Peak, and Mata Thi:ja, although the location of Mata Thi:ja has not been confirmed. All locations contain views of the diverse landforms present in the Project area, including Mount Wilson, Squaw Peak, Pilot Knob, and the Black Mountains, and the panoramic views of the Detrital Valley. The landforms exhibit high levels of variation in form, line, color, and texture. The valleys are rolling to undulating with the more distant rounded to peaked hills and mountains. Soils range from gray to beige and reddish tan, and the hills and mountains are browns, reds, tans, and grays, all with bluish hues at a distance. The hills and mountains have a texture that appears smooth to rough depending upon location and distance. Vegetation is scattered, and patchy to uniform in distribution. Shrubs are short to tall, generally rounded, but with some vertical cacti and yuccas. Colors include greens, browns, reds, purple, and yellow. Manmade features seen from Senator Mountain (KOP 169), a high elevation viewpoint located 1.4 miles east of the Project Area, include community structures (generally white) and roads, the single lane dirt Squaw Peak Road running north-south along the eastern portion of the Project Area, and the dull metallic gray Mead-Phoenix and Liberty-Mead high voltage transmission lines along with its dirt service roads and tower pads. The manmade features seen from Squaw Peak (KOP 173) located inside the Project boundary for all action

alternatives and on the east side of Squaw Peak and Young Mountain, include a reddish tan dirt road and a vertical slender metallic meteorological tower in the foreground of the view. As discussed in Section 4.6.2.1, the location of Mata Thija is uncertain, but a proxy location was selected by the Haulapai Tribe for a visual KOP. Manmade features seen from the proxy location for Mata Thi:ja KOP (171), situated inside the Project boundary defined by Alternative A and at the Project boundary defined by Alternatives B and C, includes the dull metallic lattice towers and wires of the Liberty-Mead 345-kV and Mead-Phoenix 500-kV transmission lines and the reddish tan dirt road that cross the foreground of the view. Views from each location are considered stationary, as these are destinations. Viewer sensitivity is assumed to be high (Section 3.12.4.2). However, the number of visitors and frequency of visits to these locations are unknown.

- ***US 93*** – US 93 is a paved highway connecting Wickenburg, Arizona to areas located north of Las Vegas, Nevada. The divided highway passes approximately 3-5 miles southwest of the Project Area, in a section identified as a scenic route in the Mohave County General Plan (Mohave County 2010). Average daily traffic in the section of US 93 located southwest of the Project Area measured approximately 10,300 vehicles per day (ADOT 2009).

  The US 93 viewer area was analyzed using KOP 1 (Householder Pass) and KOP 13 (Rosie's Den). Views from US 93 include portions of the Project Area sited on both BLM- and Reclamation-administered lands. The valley landform is flat to rolling with rounded to peaked hills and mountains. The grayish to reddish soil is scattered with darker pebbles. The hills and mountains are texturally smooth to coarse with erosion channels. They appear to be medium to dark gray with red hues, and with bluish hues for the more distant features. The valley vegetation includes short tan grasses, rounded short to tall green, tan, and brown shrubs (leaves and branches), with some widely scattered vertical cacti. Manmade features include the dark gray linear divided highway, a barbed wire fence and brown wood vehicle barrier in the immediate foregrounds, and two parallel rows of dull metallic gray lattice transmission towers in the distance. Although the transmission lines and towers are incongruent with the surrounding landscape elements they do not compete with more natural-appearing landscape features due to the large scale of the landscape relative to these structures. Views from US 93 are considered transient, as motorists are assumed to be traveling at the posted speed limit of 65 mph and visual sensitivity of motorists is assumed to be moderate (Section 3.12.4.2). Motorists would view the Project from varying angles of observation; however views would be predominantly accessed at an oblique angle.

- ***Residential Areas*** – The Residential Area includes the unincorporated residential community of White Hills, and residences on Indian Peak Road. The residences on Indian Peak Road are located approximately 1.0 miles at its closest point from the southern boundary of the Project Area, and are composed of development on private parcels, interspersed within BLM-administered land in a checkerboard pattern. Fewer than 100 homes are located in a square mile development south of Indian Peak Road. Views toward the Project Area to the north are described as open and panoramic. Views include Senator Peak, Squaw Peak, and Mount Wilson characterized by moderate to high levels of variation in form, line, color, and texture. The landform is convex uphill and rolling and with rounded to peaked mountains in the distance. The soil is gray to reddish tan with light and dark pebbles. The mountains are texturally smooth to medium with erosion channels. They appear light reddish brown to dark gray with red hues, and the more distant mountains also have bluish hues. The patchy vegetation includes rounded short to tall shrubs with interspersed vertical cacti and yucca. Colors are green, brown, gray, and tan and include leaves, branches, and trunks. Manmade structures include the dull metallic gray lattice towers of the Mead-Phoenix and Liberty-Mead high voltage transmission lines; however, they are distant and indistinct to the casual viewer. Views from residential areas are considered prolonged, and the Project would be seen from varying angles of observation. Viewer sensitivity is assumed to be high (Section 3.12.4.2).

4.12.1.5 BLM Contrast Rating Procedure

The BLM Contrast Rating procedure was used to determine visual contrast that may result from the construction and operation of the Project and was based on photo simulations depicting Project features. Visual contrast between the Project and the existing landscape character is used to determine the adverse effects to visual resources. Impact determinations are based on the identified level of contrast, and are not a measure of the overall attractiveness of the Project (BLM 1986).

At each KOP, existing landforms, vegetation, and structures were described using the basic components of form, line, color, and texture. Project features were then evaluated using simulations, and described using the same basic elements of form, line, color, and texture. The level of perceived contrast between the proposed Project and the existing landscape was then classified using the following definitions:

None: The element contrast is not visible or perceived.

Weak: The element contrast can be seen but does not attract attention.

Moderate: The element contrast begins to attract attention and begins to dominate the characteristic landscape.

Strong: The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

The level of contrast was assessed for all Project components used during construction, operations and maintenance, and decommissioning of the proposed Project. The level of visual contrast expected to result from construction or decommissioning related activities was estimated based on knowledge of anticipated activities and equipment that would be present. No photo simulations of construction or decommissioning were developed. Contrast Rating Forms are provided in Appendix D.

4.12.1.6 Visual Resource Inventory Analysis

The visual resource inventory analysis was used to identify expected change to VRI Classes (Section 3.12.4.2) based on changes to the visual resource values of scenic quality, visual sensitivity, and/or distance zones that may result from operation of the proposed Project. This analysis was completed within the framework of the existing VRI, and at the scale of designated Scenic Quality Rating Units (SQRUs), with the goal of understanding how visual resource values and resulting VRI Class may shift at the planning level based on operation of the proposed Project. The analysis was restricted to SQRUs 41 and 14 / Sensitivity Level Rating Units (SLRU) 13 and 65 that overlapped the Project Area. No VRI analysis was completed for adjacent units. Because the proposed Project is located on lands inventoried as VRI Class IV, no reduction in VRI Class is possible. Likewise, the scenic quality score for the Project Area was ranked as Class C, and therefore could not be reduced any further. The VRI analysis thus focused solely on identifying impacts to scenic quality, visual sensitivity, and/or distance zones that may result from the proposed Project. Typically impacts to these VRI components would be evaluated by ranking each key factor used to classify scenic quality or visual sensitivity under operational conditions, and comparing those values to that determined through the established (pre-Project) VRI. Because data was lacking from the scenic quality and sensitivity level analysis completed for the VRI of the Kingman FO, no comparison was made to these data. A discussion of impacts to scenic quality and visual sensitivity is presented below.

- ***Scenic Quality*** – Scenic quality is defined as the visual appeal of a tract of land (BLM 1986). Impacts to scenic quality was determined by evaluating the intensity and extent of potential direct impacts of the proposed Project on the seven key factors used to classify scenic quality (landform, vegetation, water, color, scarcity, adjacent scenery and cultural modification).

  No change was expected to result in scenic quality scores for water, color, or adjacent scenery. Although changes to landform and vegetation would occur under all action alternatives, changes are not expected to affect scores for these key factors. Based on this assumption, the analysis focused on the intensity and extent of change to scenic quality that may result from the introduction of cultural modification to the analysis area. The intensity (magnitude) of the action is defined as follows:

  > **Low Intensity:** A change in a resource condition is perceptible, but it does not noticeably alter the resource function in the ecosystem or cultural context.
  >
  > Components used to determine low intensity include weak visual contrast, high visual absorption, short viewer duration, and small spatial scale.
  >
  > **Medium Intensity:** A change in a resource condition is measurable or observable, and an alteration to the resource function in the ecosystem or cultural context is detectable.
  >
  > The component used to determine medium intensity is a moderate visual contrast.
  >
  > **High Intensity:** A change in a resource condition is measurable or observable, and an alteration to the resource function in the ecosystem or cultural context is clearly and consistently observable.
  >
  > Components used to determine high intensity include strong visual contrast, prolonged viewer duration, and large spatial scale or special dominance.

  The geographic extent of the action was defined by the percentage of the SQRU affected by high and moderate contrast of the Project during day and/or night conditions. For the purpose of this analysis, it was assumed that moderate visual contrast could result from the proposed Project during night conditions for the geographic extent of the viewshed, and therefore geographic extent was defined by that area.

- ***Visual Sensitivity*** – Visual sensitivity is defined as a measure of public concern for scenic quality (BLM 1986). For the purpose of this analysis, visual sensitivity was ranked as high, medium, or low based on criteria described in Section 3.12.4.2. Change in visual sensitivity was determined by evaluating the potential for direct and indirect impacts of the proposed Project to alter existing assumptions of visual sensitivity within SLRU 65 or SLRU 13.

- ***Distance Zones*** – Distance zones represent the distance from which the landscape is most commonly viewed, and are established by buffering common travel routes and viewer locations at distances of 3 miles, 5 miles, and 15 miles. To identify potential change in the classification of distance zones, all new and improved roads that would result from operation of the Project were evaluated to determine the expected level of use. Change in distance zones is expected where new or improved roads would be used as common access routes.

4.12.1.7 Conformance with VRM Objectives

The proposed Project is located, in part, on BLM-administered lands managed by VRM Class IV objectives. The VRM Class IV objective is to provide for management activities that require major modification of the landscape. To determine conformance of the proposed Project with this management objective, the level of contrast identified through the contrast rating procedure was compared to acceptable levels of contrast for VRM Class IV. For VRM Class IV areas, “contrast may dominate the view and be the major focus of viewer attention” (BLM 1986).

4.12.1.8 Photographic Simulations

To support the visual resource impact analysis, and to disclose expected visibility of Project components from various vantage points, photographic simulations were prepared for each KOP (Appendix D). Simulations were produced by rendering of Project components (turbines, substations, access roads, etc.) using 3D computer models, and super-imposing these images onto photographs taken from KOPs. Model parameters account for environmental factors, such as viewing angle and light conditions, thereby resulting in an accurate virtual representation of the appearance of the proposed Project. Atmospheric haze was not added in simulations; however, lighting conditions present when the photograph was taken may reduce the perceived clarity of the atmosphere. Views of the Project from all KOPs were simulated under daylight conditions. Simulations of the appearance of night conditions were created for three KOPs using photographs obtained during a three-quarter moon. Night condition simulations depicted appearance of existing lighting and the obstruction lighting on turbines.

Simulations modeled a white Vestas brand turbine, as this model is being considered by BP Wind Energy for this Project. This turbine type is characterized by a hub height of 294 feet (90 meters), and a maximum blade height of approximately 483 feet (146.5 meters). All turbine hubs were oriented facing south based on the prevailing southerly wind in the Project Area. The location of ancillary facilities was based on the layout described in Alternative A, Option 1 for the collector lines (all below ground) and substation and switchyard transmission line interconnection with the 345-kV Liberty-Mead line. Additional simulations for the increased limits of disturbance and Option 2 aboveground collector lines with 65 foot tall self-weathering poles were modeled for KOP 2 (Entrance to Lake Mead NRA) and KOP 169 (Senator Mountain). As shown on Figure 2-7, the limits of disturbance along the collection line corridors varies from 56 to 136 feet (widest next to the substation),

A total of 33 static simulations and two animated simulations of the proposed Project were completed. Simulations of Project features and layout specified by Alternative B and/or C were produced for selected KOPs where changes in turbine number and configuration were expected to alter the appearance of the proposed Project as defined by Alternative A. Where the proposed layout of Alternatives B and C were expected to result in nearly identical appearance, one of the alternatives was selected for simulation. Collectively, the simulations demonstrated a range of conditions under which Alternatives A, B, and C of proposed Project would be viewed (time of day, atmospheric conditions, distance, and cardinal direction). An animation was produced to simulate the motion of the turning blades and the flashing of synchronized nighttime lighting. This animation is located on the BLM Project website at www.blm.gov/az/st/en/prog/energy/wind/mohave.html. (One simulation and one animation were produced to depict daytime lighting on turbines painted BLM Standard Environmental Color “Shadow Gray” [Figures D-5(g) and D-5(h) in Appendix D]. These images were used to support the analysis presented in the DEIS; however the FAA has since revised their guidance to no longer allow turbines to be painted anything other than white, off-white, or light gray. Consequently, this design option of a darker color is not included in the FEIS.)

The static simulations are presented as a set of two photographs: One photograph demonstrating existing conditions, and the second photograph of the same view includes the simulation of the Project facilities. On each photograph sheet the following information is recorded: date and time, latitude and longitude, weather, camera and lens type, viewing direction of the photograph, and distance to the nearest turbine based on a preliminary engineering plan of the turbine layout.

Simulation Validation

To validate the accuracy of the simulations, five existing turbines located southwest of Kingman, Arizona were photographed. Efforts were made to document similar viewing conditions (lighting and viewing distance) as those experienced from the KOPs used in the proposed Project. One photograph was taken to represent a nighttime view of a turbine, complete with hazard lighting, at a distance of 0.9 miles. Photographs used in the validation of simulations are presented in Figures D-11 through D-23 of Appendix D. The photographic simulations and representative photographs were designed to be viewed 18 inches from the viewer's eye when printed on an 11x17-inch page. This distance portrays the most realistic life-sized images as seen from KOPs.

4.12.1.9 Project Options

As described in Chapter 2, Section 2.6.1, certain Project features are treated as options and include:

- Turbine color – either RAL 9010 "Pure White," RAL 7035 "Light Grey," off-white between these two colors, or their equivalent
- Transmission line interconnection – either at the Liberty-Mead 345-kV line with 8 acres of long-term ground disturbance (11 acres temporary) or at the Mead-Phoenix 500-kV line with 10 acres of long-term disturbance (18 acres temporary)
- Collector lines – either all below ground or partially below and partially above ground

A brief summary of the visual effects for these Project options follows.

Turbine Color Option – Light Gray

Turbine color is an option that may mitigate visual effects, with the more effective color option influenced by the backdrop from the viewing position (landscape terrain or skyline); however, the same color of turbine would be used throughout the Project. The contrast rating analysis indicated that a strong contrast in form, line, color, and texture would result from wind turbines as proposed. At distances of greater than 5 miles, contrast with the smooth texture of the turbines against the coarse texture of the surrounding environment would be reduced to moderate and weak levels; however, a white color for the turbines would contribute substantially to the persistence of strong contrast in form, line, and color across greater distances.

As discussed in Section 2.5.2.3, the FAA is in the process of updating of rewriting the FAA Obstruction Lighting Advisory Circular AC 70-15 7460-1K to provide more clear guidance and better consistency in turbine visibility rules. Based on recent coordination with the FAA (Patterson 2012), it is anticipated that the new advisory circular will specify that turbines must be shades of white or off-white. An acceptable white color is expected to include RAL 9010 or an equivalent color. The darkest acceptable off-white color for wind turbines is expected to be RAL 7035 (light grey on the RAL standardized color chart) or equivalent. The FAA is no longer including provisions to allow for dark paint colors and white strobe lights to be used for daytime marking/lighting, as had been allowed at the time the Draft EIS was prepared (Patterson 2012).

A design option being evaluated is to paint the wind turbines the darkest shade that is expected to be approved by the FAA, which is RAL 7035, "Light Grey." Based on one example of side-lit white and light gray turbines (see Section 4.12.3.4), the light gray turbines appeared to have a stronger contrast for color than white turbines against a light blue sky and against white clouds. The light gray turbines appeared to have less of a contrast than the white turbines when seen surrounded by the various colors of landforms and vegetation. Contrast in form, line, color, and texture of white and light gray turbines would be expected to vary with distance, lighting, and other circumstances.

Transmission Line Interconnection

In the case of the interconnection to the electrical grid and the associated size of the switchyard, the option depends on which company (or companies) purchases the power generated by the Project. From a visual resource perspective, the only difference between a 345-kV interconnection versus a 500-kV interconnection is that a 500-kV interconnection would require a larger switchyard that would result in approximately 7 acres more temporary disturbance and 2 acres more long-term disturbance. While switchyard equipment size and layout may differ somewhat between the two options, this would not be expected to result in a discernible visual difference. The 500-kV switchyard, with the greater land disturbance, would have more visual impact than the 345-kV switchyard, but the location of the switchyard within the interior of the Project would limit the views from most viewpoints, and would be seen infrequently by the public.

Collector Lines

The use of aboveground collector lines is an option where environmental conditions (for example, spanning ravines or expanses of solid rock) make an underground collection system less suitable. Because of the amount of ground disturbance required to place collector lines in buried trenches, particularly as the collector lines approach the substation and require multiple parallel trenches, underground collector lines would have a greater visual impact during construction than aboveground collector lines. This impact would continue until required reclamation would reestablish vegetation with a similar vegetation type and quantity to appear similar to the pre-construction conditions. Once reclamation criteria have been successfully met, the long-term visual impacts from underground collector lines would be minimal.

Aboveground collector lines would be positioned within the area of temporary ground disturbance associated with the access roads and would not be expected to influence the visual impacts of ground disturbance associated with the construction and early restoration periods. However, for the life of the Project, aboveground collector lines would require the use of 35- to 65-foot tall steel or concrete support structures. While dwarfed in size compared to the turbines, the addition of this linear feature would still contribute to the long-term visual impacts, although the degree of such impacts would be limited to viewpoints where the support structures and collector lines could be seen.

Obstruction Lighting

While not a current Project option, there may be a future option to equip the Project with an Audio Visual Warning System to warn pilots of the flight obstructions at night. An Audio Visual Warning System would allow night lighting to remain off, unless an aircraft is detected in close proximity, and at an unsafe heading. Current approved obstruction lighting would result in a strong contrast against the night sky. Mitigation to reduce visual contrast resulting from lighting could include the Audio Visual Warning System, however the FAA has not approved the system for operations within the United States. If a system is approved, BLM and Reclamation may consider the application of such a system to the Project as an adaptive management tool, particularly if this is determined to effectively mitigate visual concerns from the currently approved obstruction warning light system required at night. Agency decisions pertaining to the implementation of such a warning system would include:

- FAA approval of an Advanced Warning System and the Projects future revised applications to the FAA to implement such a system (to be tracked through the FAA circular and annual requests for updates from the FAA on any approved systems)
- Successful test application at one or two other commercial-scale wind farms to demonstrate the system works reliably and effectively
- Anticipated remaining life span for the Mohave County Wind Farm Project is at least 20 years

- System's effectiveness in reducing the time that the strobe lights are flashing is at least a 50 percent reduction
- Implementation costs would not exceed $4,000 per MW of installed nameplate capacity based on 2013 dollar values, adjusted per the Consumer Price Index for inflation
- Anticipated effectiveness of mitigating visual contrast and impacts on dark skies in consideration of other land development in the Project Area at the time of implementation

BLM, Reclamation, and BP Wind Energy would discuss the potential application of an Advanced Warning System within one year of FAA approval and the availability of test application results being available for at least one commercial wind farm project. If the initial evaluation results in a decision to dismiss the application of the Advanced Warning System for the Project, a second review and evaluation would occur within five years of the initial decision to account for changes in technology, costs, or resource impacts that may occur over time.

4.12.2 Alternative A – Proposed Action

Impacts to visual resources are expected to be similar across all action alternatives when viewed from US 93, the residential area, and locations representing Traditional Cultural Resources of the Hualapai Tribal Members. Impacts observed from Temple Bar Road and the Lake Mead NRA are expected to differ across action alternatives and are discussed in the analysis of each alternative in terms of the level of perceived visual contrast experienced from the viewer positions.

The balance of this section describes anticipated direct and indirect effects that may occur as a result of construction, operations and maintenance, and decommissioning of Alternative A of the proposed Project. Alternative A would occur on approximately 38,099 acres of BLM-administered lands managed by VRM Class IV objectives.

4.12.2.1 Construction

Visual Contrast

Potential temporary and short-term localized direct impacts to visual resources are expected to result from the numerous workers, construction vehicles, turbine delivery trucks, worker vehicles, dust, and other the construction-related activities. It is expected that, collectively, construction-related actions would create a mosaic of color, glare, angular lines, and smooth texture to the landscape, that could introduce strong contrast in form, line, color, and texture against the existing landscape of the Project Area. Existing landscape character would also be temporarily altered by exposed soil from cut/fill, and scarring of the ground plane for construction staging, laydown areas, turbine clear-zones, installation of underground collection systems, and development of new and improved roadways. The recovery time for disturbed areas may vary based on season and weather within the region. It is expected that visual contrast in form, line, color and texture would increase incrementally as Project features, such as turbines, roads, and transmission poles, come into view. These features may draw attention to the Project Area and the construction activities underway. The level of contrast expected to result from construction-related impacts is summarized in Table 4-27.

The level of contrast would vary depending on analysis factors, such as the location of the viewer in relation to the Project (i.e., distance), visibility, duration of view, and possible development of the Project in construction intervals to coincide with secured power purchase agreements. Construction of Alternative A would result in strong visual contrast when viewed from Temple Bar Road. From Temple Bar Road, contrast would be visible during the construction of turbines and roads in the northwest portion of the

Project Area (west of Squaw Peak). Construction-related impacts to views experienced by recreators accessing the NRA via Temple Bar Road would be of short duration.

When viewed from the lake and adjacent uplands in the Lake Mead NRA, construction-related actions would result in weak visual contrast. The majority of activity would occur on and near the ground, and consequently would be shielded by topography. These impacts constructed within the ground plane would be most visible from higher elevation (superior) positions, such as KOP 169 at Senator Mountain. Roadway travelers on US 93 would have the greatest exposure to the staging and laydown area located in the southwest border of the Project Area; however views would be transient and typically experienced at speeds of approximately 65 mph.

Constructing the Project in intervals could reduce the duration of short-term visual conflicts by reducing the area where construction activities occur during a period of time. The areas where turbines are constructed first could be visible for a longer duration relative to turbines constructed at during a subsequent construction interval. However, the turbines constructed in later construction intervals would be visible for a shorter duration than if the Project were built in a single construction interval. This could reduce the amount of time construction activities were visible from higher elevations such ask KOP 169.

Construction of the Project would be subject to BLM's BMPs (Appendix B), the site-specific SWPPP, and the terms of the Integrated Reclamation Plan, and would be monitored per the Environmental Construction and Compliance Monitoring Plan (ECCMP) as described in Sections 2.5.1 and 2.5.2. During final design, detailed plans would be developed and reviewed with BLM and other appropriate agencies with jurisdictional or technical expertise or regulatory responsibilities.

Table 4-27 Level of Visual Contrast Expected to Result from Construction of the Project

Project Feature	Expected Contrast	Assumptions
Laydown Areas and Batch Plant	• Strong short-term contrast in form (shape), line, color, and texture due to removal of vegetation and resurfacing with gravel. • Consolidation of construction materials could mimic appearance of structures, and could create strong short-term contrast in form, line, color, and texture. • Laydown yards would be most visible from US 93, residential areas, and locations representing traditional cultural places of the Hualapai Tribe.	• No major alteration to landforms would be required. • The temporary facilities would be removed as soon as practical. • Reclamation of the area would meet BLM and Reclamation success criteria for restoration of plant communities, as defined in the Integrated Reclamation Plan.

Project Feature	Expected Contrast	Assumptions
Turbine Structures	• Alteration of landforms where leveling is required for turbine pads would create incremental moderate contrast in form and line due to contrast between flat, horizontal lines, and the gently rolling appearance of the existing landscape. • Clear Zone required for hub/blade assembly would result in strong short-term contrast in form (shape), line, color, and texture against the surrounding area. • Installation of these structures would result in an immediate contrast in form, line, color, and texture	• Dust suppression design features for fugitive dust control would minimize impacts to visual resources that could result from reduced visibility. • All vegetation would be cleared in the Clear Zone. • Turbine hubs would be from 264 feet to 345 feet above the ground, depending on the turbine selected. The rotating blade tips would be between 390 feet to 539 feet above the ground. Different turbine could be used within the Project, but the turbines within a corridor would be the same type. • Turbines would be a shade of white with a non-reflective matte or satin finish (such as RAL 9010) or a light gray (no darker than RAL 7035 or equivalent). • Approximately half of the turbines would be lighted at night by red simultaneously flashing strobe lights. The beam would be concentrated in the horizontal plane, minimizing light to the ground.
New / Improved Project Roads and Underground Collection System	• Incremental increase in bold curvilinear lines across the Project Area during construction would create strong contrast in line, color, and texture as vegetation is removed and roads are resurfaced. • If blasting is required, strong contrast in form, line, color, and texture is expected to result from alteration of the landform. • Where construction of a road prism is required, strong contrast in form, line, color, and texture is expected to result from alteration of the landform.	• Dust suppression design features for fugitive dust control would minimize impacts to visual resources that could result from reduced visibility. • Construction of underground collection cables would occur concurrently with road construction. Collector line cables would be buried parallel to the interior roads connecting the turbine corridors; the construction area disturbance would range from 56 feet to 136 feet in width. • The primary access road surface would be 30 to 40 feet wide. Interior turbine corridor roads would generally be 36 feet wide but could be up to 56 feet wide during construction. Post-construction width for all interior roads, including shoulders, would be narrowed to 20 feet and the former width would be reclaimed and revegetated. Restoration would follow the plan proposed by BP Wind Energy and approved by BLM and Reclamation.
Overhead Transmission Line	• Installation of the conductors and support structures would cause an incremental change in line and texture that would result in weak to moderate contrast.	• No alteration to landform would be required beyond clearing or grading. • Structures for the majority of the line would be steel or concrete monopoles that are nonspecular or a color suitable for the environment. • The conductors would be nonspecular. • A 20-foot-wide construction road (10 feet on either side of centerline) would be required and retained for operations and maintenance.

Project Feature	Expected Contrast	Assumptions
Inter-connection Switchyard	• Installation of the switchyard is expected to result in strong contrast of color and texture where vegetation is cleared for construction (up to 11 acres for Liberty-Mead Option; up to 18 acres for Mead-Phoenix Option). • Installation of support structures would cause an incremental change in line and texture that would result in weak to moderate contrast.	• No alteration to landform would be required beyond clearing or grading. • Dust suppression design features for fugitive dust control would minimize impacts to visual resources that could result from reduced visibility. • Structures for the majority of the interconnection would be steel or concrete monopoles that are nonspecular or a color suitable for the environment. • The conductors would be nonspecular.
Project Substations	• Installation of these structures would cause an incremental change in line, color and texture that would result in strong contrast.	• No alteration to landform would be required beyond clearing or grading. • The small control buildings would be painted a neutral color with muted tones to blend with the environment. • Components would typically have a maximum height of 35 feet (lightning masts would have heights closer to 75 feet) and the conductive components would have nonspecular metal surfaces.
O&M Facilities	• Installation of these structures would result in an incremental change in line, color and texture where clearing, grading, and resurfacing is required. • Installation of the building would result in an immediate contrast in line, color, and texture.	• No alteration to landform would be required beyond clearing or grading. • The building would be approximately 60 feet by 100 feet and 16 feet high, with the roof and side panels painted a color to blend with the environment. • Fences would be treated to minimize metal reflections.
Aggregate Pit	• Weak contrast in form, line, color, and texture against the surrounding landscape result from obtaining source materials from the Detrital Wash Materials Pit	• Side slopes would be contoured. • The existing quarry and processing area would not be decommissioned.
General Construction Activities / Work Force	• Operation of construction vehicles would introduce a mosaic of form, line, color, and texture that would result in strong visual contrast. • Increased activity and movement by people and vehicles would result in a strong contrast to existing static landscape during construction of the Project.	• Dust suppression design features for fugitive dust control would minimize impacts to visual resources that could result from reduced visibility. • Construction-related waste would be removed from the site. • Construction traffic is assumed to be at a level described in Chapter 2, Proposed Action and Alternatives.

Wind Turbines

Direct impacts to visual resources are expected to result from the strong visual contrast of the turbines against the existing landscape. Wind turbines, as proposed, would introduce bold, white, vertical and diagonal lines to the landscape. The structures would appear smooth and uniform. Turbine pads would appear round, flat and tan-gray colored, depending on the color of gravel used around the turbine pads, and would result in strong contrast against the reddish–green shades of the landcover. The configuration of turbine strings would create a sequence of vertical lines. This systematic repetition of structures would contrast the landscape to varying degrees depending on the angle of observation. Operation of turbines would introduce motion to an otherwise still environment, and turbine hazard lighting would create strong contrast against the darkness of existing night skies. The movement of turbines blades could cause shadow flicker under certain seasonal and atmospheric conditions.

The required megawatts of the proposed Project could be achieved using several different turbine sizes and configurations. For example, the increased energy output of larger turbines would result in the need for fewer turbines. Larger turbines would be spaced farther apart, and the total area of ground disturbance would be slightly less than that resulting from smaller, more numerous turbines. Corridor locations would remain the same regardless of turbine design. Impacts to visual resources resulting from each turbine size are expected to be similar despite the 100 foot difference in height between the smallest and largest turbine model. However visibility of larger turbines from some areas, such as on Lake Mead, may increase, as a greater portion of the turbine hubs and blades would be visible above the horizon. Likewise, larger turbines would be expected to be visible at a greater distance due to size. Should a combination of turbines be used, it is possible that the lack of symmetry in the structures could appear less visually coherent than a design composed of identical turbines. A row of taller turbines next to a row of shorter turbines would attract attention, but not as much as the Project itself.

Perceived visual contrast would be strongest when viewed from within the Project Area (i.e., Squaw Peak, Mata Thi:ja), and from adjacent viewer areas located within the Foreground/Middleground distance zone (3 to 5 miles). Visual contrast would decrease with distance due to atmospheric haze, vegetation screening, and variable topography present in the analysis area.

Constructing the Project in intervals could increase impacts to some sensitive viewpoints in the short term if there was an increase in the duration of construction activities. Areas of temporary disturbance would be reclaimed as soon as practical after construction activities ceased, so disturbance in early construction intervals could potentially be in recovery stages before disturbance in subsequent phases begins. Construction intervals would not change the long-term impacts on visual resources as the number of turbines and other Project facilities would remain the same.

Project Roads

Project roads would appear as bold, tan to gray curvilinear lines with a smooth texture that would contrast the form, line, color, and texture of the existing landscape. Strongest visual contrast would be observed from superior vantage points, such as Senator Mountain (KOP 169), or where the road would require alteration of the existing landform, such as that required near Squaw Peak (KOP 173). While the roads trending north/south would be up to 136-feet wide near the switchyards, the Project view from Senator Mountain (KOP 169) would be oriented so that the narrower east/west turbine corridor roads would be more pronounced. Project roads are expected to result in weak to moderate contrast when viewed from US 93 and the residential areas of Whites Hills and Indian Peak Road. From these locations, it is expected that Project roads would appear as disjunct segments, with the majority of contrast resulting from color differences between of the pale gray roadway and the darker hues of the existing landform and vegetation. This contrast would be reduced due to variable topography and diversity of color and textures in existing landform, even for the north/south trending roads that be as wide as 136 feet near the switchyards during construction to accommodate collector line trenches. The contrast of the roads would be subordinate to that expected to result from turbines.

Substations

Two substations would be required for operation of the proposed Project. One substation would be located adjacent to the existing Mead-Phoenix and Liberty-Mead transmission lines. The second substation would be located at the northern terminus of the proposed transmission interconnect line, and would primarily be seen by viewers located within the Project Area, such as those traveling on Squaw Peak Road, or located at areas identified by the Hualapai Tribe as representative of cultural locations. The vertical and angular structure and flat, square substation pad would strongly contrast with the softer lines of the surrounding landform and vegetation when viewed from Senator Mountain or Squaw Peak. Beyond 5 miles, visual contrast of the substation is expected to decline to weak. The structure is expected to be seen, but would not attract attention. Contrast of the substations would be subordinate to that expected to result from turbines.

Overhead Transmission Interconnect Lines and Switchyard

Transmission lines and associated transmission poles would appear as sequentially aligned vertical structures (monopoles) that would result in moderate contrast to the existing undeveloped landscapes. The switchyard structures would consist of circuit breakers and air switches without transformers. Anticipated transmission-line and switchyard related contrasts would be consistent across alternatives. Where the fiber optic communication would be mounted near the top of the transmission line, no additional contrast beyond what results from the transmission lines is expected. The transmission lines and poles would primarily be viewed by motorists on Squaw Peak Road, or locations identified by the Hualapai Tribe as representative of cultural locations. The level of contrast would be considered weak. Contrast of the switchyard would be subordinate to that expected to result from turbines.

Collector Lines

Collector lines could be either underground or overhead. Underground collector lines would be collocated to the extent possible with new and improved Project roads. Lines would be buried in trenches measuring 2 feet wide; however wider trenches or multiple trenches would be required where multiple sets of cables would be placed. It is expected that visual contrast of trenches would not be evident during operations, as areas would be reclaimed and reseeded with native vegetation. However, the reclaimed areas would contrast with undisturbed areas to some degree until successional vegetative species become established. Overhead collector lines would be supported by concrete or Cor-Ten® (self-weathering) steel monopoles measuring approximately 35 to 65 feet tall, and placed at intervals of approximately 250 feet apart. Poles for the overhead collector lines would introduce vertical and horizontal lines that are expected to result in weak contrast against the surrounding landscape. Contrast from collector lines and poles would be subdominant to surrounding turbines and transmission lines.

Operations and Maintenance Building

One O&M facility would be located at the southwest border of the Project Area, approximately 3 miles from US 93. The structure, as proposed, would measure 60 feet by 100 feet, and extend 16 feet in height. The structure would be painted to blend in with the surrounding landscape and minimize visual contrast. The level of degree of contrast expected to result from the building may be reduced by choosing a paint color that would blend with the surrounding and background landscape. Broad, gravel areas (5 acres) would create flat, geometric shapes that result in strong contrast against existing vegetation and topography. The chain-link fence surrounding the structure would create vertical, horizontal, and angular lines, gray color and smooth texture that would appear unnatural against the largely undeveloped surroundings. The structure would primarily be seen by motorists on US 93. Views would be transient, as experienced at high speeds. Overall contrast of the O&M building is expected to be weak. The structure would be visible but would not attract attention. Contrast of the operations and maintenance area would be subordinate to that expected to result from the turbines.

Meteorological Towers (Temporary and Permanent)

Met towers are described as metal lattice structures with three or four legs and red obstruction lights, and measuring approximately 280 feet tall. The structures would be similar in appearance to radio towers. Operation of met towers would introduce vertical and diagonal lines to the landscape. At the current design stage, the specific location of met towers is not known, however it is assumed that the structures would result in weak to moderate contrast, and would be sub-dominant to the proposed wind turbines. No further discussion of potential visual impacts from met towers is presented in this document.

4.12.2.2 Operations and Maintenance

Visual Contrast

Visibility of Project features and expected level of contrast would vary based on the specific location of the viewer, and the configuration of Project components defined by each alternative. Long-term indirect impacts resulting from operations and maintenance of the proposed Project could include a general change in perception of the visual resources of the area over time. Individuals could be drawn to the Project Area to see turbines in close proximity, or may avoid the area due to perceived negative impacts. Long-term direct impacts are described below in terms of both expected level of visual contrast of each Project component, and the anticipated impacts to VRI Class, including component scores for scenic quality, visual sensitivity, and distance zones.

Analysis is based upon the visual simulations (as described in Section 4.12.1.8 and as referred to in the following text), field verification, and the contrast rating analysis to determine deviations in the form, line, color, and texture of the characteristic landscape due to the proposed activity. Refer to Appendix D, forms 8400-04, for the contrast form descriptions.

- ***Temple Bar Road*** – Should Alternative A be selected, the proposed Project would be situated approximately 3.9 from the entrance to the Lake Mead NRA on Temple Bar Road. Viewers would see the Project from varying vantage points as they traveled north- and southbound. During the peak visitor use in the summer, the turbines would be front lit and side lit in the morning when most visitors would be traveling northbound (toward Lake Mead NRA), and side lit and back lit in the afternoon when most visitors would be exiting the NRA ((Figure D-2(b), Figure D-2(d)). Direct impacts to visual resources would result from the introduction of structures that would contrast the existing landscape during the daytime and nighttime. Narrow, white, vertical turbines would result in strong contrast against the rounded, stippled, olive and brown vegetation, the horizontal reddish-tan to light gray rolling hills and exposed bedrock, and the horizontal and diagonal lines and brown to dark gray colored backdrop of Squaw Peak. The lack of vegetation and gravel surfacing of Project roads would appear as disjunct tan to gray curvilinear lines. The appearance of road segments would mimic existing variation in landform to some extent, thereby resulting in moderate contrast (Figure D-2(b), Figure D-2(d)). The Project would appear similar in scale to the existing landscape. The movement of the rotating turbine blades would contrast the otherwise still landscape, and would attract attention of the casual observer. Synchronized flashing of the red aviation obstruction warning lights at night would result in strong contrast to the landforms in the background, and night sky where turbines rise above the horizon (Figure D-2(h)).

  Impacts to visual resources from views of the Project from Temple Bar Road would be temporary. Motorists accessing the park on Temple Bar Road would view the Project Area for approximately 9 miles between US 93 to the Lake Mead NRA boundary. This view would include the portion of the Project proposed on Reclamation-administered lands. Driving at the speed limit of 50 mph, the viewers would see the Project for approximately 11 minutes from varying vantage points. Visitors exiting the park would have continuous views of proposed

Project from approximately 5 miles north of the boundary of the NRA. At the speed limit of 50 mph, and slowing down for the entrance station, views of the proposed Project from within the park would last approximately 7 minutes, and would include views of vehicle traffic on US 93. Indirect effects, such as recreators choosing other access routes to the Park in order to avoid views of the Project, are considered improbable. In summary, when viewed from Temple Bar Road, overall visual contrast of form, line, color, and texture of the Project under day and night conditions would be strong. The Project would demand attention, would not be overlooked, and would dominate in the landscape. Views of the Project would be of short duration, and would affect viewers characterized by moderate visual sensitivity.

- ***Lake Mead NRA* –** Should Alternative A be developed, wind turbines located in the northeast corner of the Project Area would be visible from the lake and adjacent upland areas in the Lake Mead NRA. The turbines, located approximately 7 miles from KOP #7, would result in weak contrast in texture, and moderate contrast in form, line, and color against the existing landscape during the daytime. The nacelle and blades of two turbines located in lower elevation areas of the northeast corner of the Project Area would be visible. When viewed from inferior (lower elevation areas) such as the lake or shoreline, these structures are expected to be screened to a greater extent by topography and vegetation. Turbines located at higher elevations in this area would be more visible; however their bases would be largely shielded by existing topography, thereby obstructing views of turbine pads and reducing contrast of visible sections of access roads. All other Project components, such as switchyards, transmission interconnect lines and, O & M buildings would be shielded by Squaw Peak and surrounding foothills. The Project viewshed indicates that turbines situated in the west side of the Project Area have the possibility of being seen from Bonelli Landing, and portions of the lake located to the north of this campground. However, these turbines would be located approximately 15 miles or more from Bonelli Landing. Views of turbines are expected to be partially screened by topography and vegetation; thereby resulting in weak visual contrast in form, line, color, and texture during the daytime. Daytime views of proposed Project from Lake Mead NRA are assumed to be intermittent, as most land-based viewers would be focused on views across the water to the north, or would be engaged in aquatic recreation. More sustained views of the Project Area may be experienced by recreators located on anchored houseboats or at campgrounds, or non-motorized recreators located in the Pinto Valley or Jimbilnan Wilderness Areas. Overall contrast of the proposed Project when viewed from the lake and adjacent uplands would be weak during daylight hours. The contrast of the Project would be seen but would not attract attention.

  The synchronized flashing of the red aviation obstruction warning lights on turbines located in the northeast corner of the Project Area would be visible from the lake and adjacent uplands during night time conditions. Although the scale of the night sky would be large relative to the size of the lighted area, obstruction lighting would be distinct, and result in moderate contrast against the night sky. Turbine hazard lighting would begin to attract attention and begin to dominate the landscape. Long-term, indirect effects that may result from turbine lighting may include selection against portions of the NRA with views of this feature by recreators seeking less-impacted views of the night sky.

- ***Traditional Cultural Locations of the Hualapai Tribe*** – Viewers situated at Senator Mountain, Mata Thi:ja, and Squaw Peak would view turbines at close proximity (0.9 mile to 1.7 miles), and from varying angles of observation. From Senator Mountain, turbines could be seen within an approximately 180º arc extending from the southwest to the northwest. Views would be experienced from a superior (higher elevation) position, creating a wide view with no screening of Project turbines and turbine pads. All turbines would be viewed below the skyline. From Mata Thi:ja, turbines would be seen at a broad northwest-facing 180º arc, and at similar elevation. Slight variation in topography would shield views of turbine pads; however the majority of tower, hub, and blades would be visible. Turbine strings would parallel the Mead-Phoenix 500-kV and Liberty-Mead 345-kV transmission lines. The strong visual contrast in form, line, color, and texture of the turbines would dominate the more transparent vertical and angular lines of the transmission towers, resulting in an overall industrial appearance to this portion of the Project Area. From Squaw Peak, turbines could be viewed from all directions. Turbines and turbine pads would be evident when viewed at close proximity, and from higher elevation vantage points. Because of the more curvilinear array of turbine strings in the northeast portion of the Project Area, turbines would appear less ordered and linear. Overall, the close proximity of turbines, and the motion associated with the blades would substantially change the character of the landscape when viewed from traditional cultural locations identified by the Hualapai Tribe. Turbines would introduce strong contrast in form, line, color and texture with the existing landscape. The motion and glint of the rotating blades during the day would add strong contrast to the static landscape. The synchronized flashing of the red aviation obstruction lights at night would introduce strong contrast in color and illumination to the night sky. The contrast of the proposed Project during both day and night conditions would demand attention, would not be overlooked, and would be dominant in the landscape during both day and night conditions. The BLM is continuing to consult with the Hualapai Tribe to determine whether the traditional cultural values of the location would be affected by the alteration of the landscape.

- ***US 93*** **–** Views of the Project from US 93 would vary based on travel direction. For example, southbound views from Householder Pass would be from a superior position, with little topographic screening of all turbines except those located in the northeast corner of the Project Area. Views from Rosie's Den, more centrally located within the valley, would be from a slightly inferior (lower elevation) position; consequently, a greater likelihood for turbine base and turbines shielded by topography. When traveling northbound, motorists would see the Project for the first time approximately 17 miles south of Rosie's Den. Visual contrast in form, line, color, and texture would increase upon approach. Views would be at an oblique angle to the north/northeast. Motorists traveling southeast would see the Project as they descended from the pass. Views would also be at an oblique angle. Motorists heading in both directions are assumed to be traveling at the posted speed limit of 65 mph, and would view the Project within the larger landscape context of the Detrital Valley, Black Mountains, and Cerbat Mountains. Turbines would be front lit, side lit, and backlit during the summer, and front lit and side lit in the winter. Daytime views of the turbines would be co-dominant with the existing highway and surrounding mountain features that characterize the landscape. Consequently, overall visual contrast observed during the day from US 93 is expected to be moderate. Contrast would begin to attract attention and begin to dominate the characteristic landscape. Blinking red hazard lights against the night sky are expected to result in strong visual contrast against the night sky. Co-dominant landscape features would not be evident. Lighting would demand attention, would not be overlooked, and would be dominant in the landscape.
- ***Residential Areas*** **–** Residential viewers would be situated between 1.2 and 4.6 miles from the southern border of the Project Area. Wind turbines would result in strong visual contrast in form, line, color, and texture against the surrounding landscape when viewed from certain areas. Views of the Project Area from many portions of the residential areas of White Hills community are shielded by topography and vegetation. It is expected that viewers situated along Indian Peak Drive, or those located in higher elevation areas in these areas would observe the highest visual contrast. From Indian Peak Drive, wide views of the turbines would be experienced at close proximity. From this vantage point, turbines would extend above the skyline of existing landforms. Turbines would be front lit, side lit, and backlit during the summer, and front lit and side lit in the winter. The flashing and the extent of hazard lighting viewed from these proximate locations would result in strong contrast to the night sky. Consequently, visual contrast observed

during both day and night from residential areas of Indian Peak Drive and White Hills is expected to be strong. Due to the proximity of the proposed Project, and the prolonged and sustained views of residents, visual contrast would demand attention, would not be overlooked, and would be dominant in the landscape.

- ***Wilderness and Proposed Wilderness*** – The boundary of the Mount Wilson Wilderness along the existing electrical transmission line is 4 to 5 miles from the three outermost turbine corridors proposed with Alternative A. Recreationists within the wilderness are assumed to have high visual sensitivity and would be able to see turbines from 68 percent of the wilderness (16,493 out of 24,235 acres) (refer to viewshed on Map 4-1). The closest designated trail is west of the electrical transmission line approximately 5.9 miles from the Project Area. Viewers on the Missouri Spring Trail, the east slopes of the Black Mountain, and Mount Wilson looking southeast would see the Project in the background zone, and would see the electrical transmission line, paved Temple Bar Road, and the night-lighted park entrance station in the foreground-middleground or background zones, depending on location. Overall visual contrast of form, line, color, and texture of the Project under day and night conditions would be strong to moderate depending upon the location and elevation of the viewer.

- The portion of the proposed wilderness in Lake Mead NRA that would be closest to the Project Area is a corner that is just west of Temple Wash and south of Squaw Peak Road. This area would be 1.8 to 2.0 miles from the two turbine corridors closest to the northeast corner of the Project Area (Map 2-2). Turbine corridors located within Township 29 North, Range 19 West, Sections 17 and 18 (Map 2-2) are somewhat farther away, but these turbines would be positioned along ridgelines, increasing their visibility from portions of the proposed wilderness. All recreationists within the Lake Mead NRA are assumed to have high visual sensitivity. Visitors would be able to see turbines from 26 percent of the Lake Mead NRA proposed wilderness (69,886 out of 265,877 acres) within the 20 mile radius of the Project Area. The closest designated trails in the proposed wilderness are west of US 93, 13 miles from the Project Area. Viewers looking southwest, south, and southeast would see the Project and an existing electrical transmission line, dirt and paved roads including US 93, the lighted park entrance station, and lighted NPS recreation facilities at Temple Basin and possibly Willow Beach, and scattered residences in the foreground-middleground or background zones depending on location. Overall visual contrast of form, line, color, and texture of the Project under day and night conditions would be strong to weak depending upon the location and elevation of the viewer.

Visual Resource Inventory Values

The Project Area occupies approximately 26,766 acres of SQRU 41 (20 percent), and 20,299 acres of SQRU 14 (1.5 percent). Based on the Project footprint of Alternative A, the viewshed of the proposed Project occupies approximately 75,743 acres of SQRU 41 (57 percent), and 128,599 acres of SQRU 14 (10 percent). Collectively, Project components described for all action alternatives could impact the VRI components of scenic quality and visual sensitivity in both SQRUs; however, due to the reduced footprint, the extent of impacts would be reduced under Alternatives B and C. Visual distance zones are not expected to change as a result of operation of the proposed Project. The analysis of scenic quality, visual sensitivity, and distance zones is presented in the following sections. No change in VRI Class would result as units cannot be reduced below the current designation of Class IV.

Scenic Quality – The proposed Project is expected to result in localized, high intensity impacts to scenic quality. Based on the viewshed model, these impacts would be evident to some extent in over half of SQRU 41. Because the majority of the affected portion of the SQRU is located within 5 miles of the Project, the intensity of impacts would be high. Modifications would be discordant and promote strong disharmony, consistent with a ranking of -4. Scenic quality would be affected in 10 percent of SQRU 14. Because the intensity and extent of cultural modification across the entire unit is unknown, no cultural modification score was established.

Visual Sensitivity – Although the low visual sensitivity of viewers situated within SLRU 13 established during the pre-1990 VRI cannot be reduced, localized changes in visual sensitivity may nonetheless result from the proposed action. Members of the Hualapai Tribe with cultural ties to traditional locations within the Project Area may become more sensitive as they notice the change to the landscape. Residential viewers may become more sensitive to the changes but would eventually become less sensitive based on an acceptance of the perceived loss of the natural setting of the Project Area. Local visitors to Lake Mead who access the Park via Squaw Peak Road could eventually become accustomed to the turbines and ancillary facilities through repeated use of these roadways, resulting in being less sensitive to change in the landscape character. As a result of the proposed Project, localized viewers within SLRU 65 could become less sensitive.

Residents in White Hills and the Indian Peak Road area may eventually become less sensitive based on perceived loss of the natural setting of the Project Area. Motorists traveling through the unit are not expected to become less sensitive, as this viewer group would experience a large portion of the SLRU that was not affected by the Project. Operation of the proposed Project could indirectly affect visual sensitivity of adjacent areas characterized by little to no cultural modification. Viewers in these more pristine areas could become more sensitive.

Distance Zones – Construction and maintenance of new and improved roads may result in increased use by recreationists accessing the Lake Mead NRA via Squaw Peak Road, or other recreation or cultural destinations within the area. However, it is assumed that the majority of visitors to the Temple Bar area of Lake Mead would still select the paved access provided by Temple Bar Road. Common travel routes and viewpoints assumed to have been used in the pre-1990 VRI would, therefore, not change as a result of the proposed Project. Consequently no change in distance zones is expected.

4.12.2.3 Decommissioning

Decommissioning activities would have a similar effect to visual resources as the construction activities. As Project features are removed during decommissioning, an incremental reduction to visual contrast would be expected. Viewers situated adjacent to the Project Area may see localized decommissioning of turbines; however views would be temporary and include an incremental reduction in visual contrast from Project components. The degree to which decommissioning of the Project would restore scenic quality of affected SQRUs would depend on the extent of other development in the area.

4.12.2.4 Project Options

Alternative A includes the white turbine option. The contrast rating analysis indicated that a strong contrast in form, line, color, and texture would result from the wind turbines as proposed. At distances of greater than 5 miles, contrast with the smooth texture of the turbines against the coarse texture of the surrounding environment would be reduced to moderate and weak levels; however the bold white color of the turbines would contribute substantially to the persistence of strong contrast in form, line, and color across greater distances.

Alternative A could include either option for the transmission line interconnection and collector lines. For a Mead-Phoenix 500-kV connection, the long-term ground disturbance for the switchyard would be approximately 2 acres larger than the switchyard that would be required for the 345-kV connection. The closest KOP to both switchyard locations is KOP 171, the proxy location for Mata Thi:ja that was selected by the Hualapai Tribe. The 500-kV location would be approximately 2 miles away and the

345-kV connection would be 2.8 miles away. Despite the closer location and larger disturbance required for the 500-kV switchyard, the difference in impacts would be minor because of the viewing angle and other existing and proposed ground disturbances and facilities.

If the collector line option of being partially below and partially above ground would be chosen, then the visual impact would be greater than if the lines were all below ground and the temporary ground disturbance was successfully reclaimed. However, considering that the poles are about 35-65 feet in height, the impact of the poles would be minor compared to the size of the turbines.

4.12.2.5 Summary of Impacts

In summary, should Alternative A be implemented, direct impacts to visual resources would result from the introduction of structures characterized by strong visual contrast against the existing landscape during both day and night from the majority of viewer areas analyzed. Strong visual contrast would be observed from traditional cultural locations identified by the both the Hualapai Tribe, residential areas, and Temple Bar Road. Views from US 93 and Temple Bar Road are expected to be of short duration, and experienced at varying angles of observation. Impacts to views from the lake and adjacent uplands in the Lake Mead NRA would be greatest during nighttime conditions. Prolonged and/or stationary views of Project components from Hualapai Tribe traditional cultural locations, residential areas, and campers situated on or adjacent to Lake Mead would be most affected. Cultural, residential, and recreational viewer groups in these areas are assumed to have high visual sensitivity. Indirect effects may cause viewers to become less sensitive over time due to reduction in scenic quality.

Although operations and maintenance of the proposed Project would be expected to result in a reduction of scenic quality in SQRU 41and visual sensitivity of SLRU 13, the VRI class assigned to both SQRUs 14 and 41 and SLRU 65 and 13 would remain a Class C. Operation of the proposed Project under Alternative A would be consistent with VRM Class IV objectives.

4.12.3 Alternative B

Alternative B would occur on approximately 30,872 acres of BLM-administered lands managed by VRM Class IV objectives. This alternative would include the elimination of approximately 10 to 30 turbines from the northwest portion of the Project Area, approximately 5 to 15 turbines from the northeast portion of the Project Area, approximately 10 to 15 turbines from the southern border of the Project Area, and approximately 5 to 10 turbines from the eastern border of the Project Area (Map 2-3).

4.12.3.1 Construction

Construction of Alternative B would create similar short-term, localized, deviations in landscape character as those described for Alternative A. Construction-related impacts would be reduced in the northwest, northeast, and southern portions of the Project Area where turbines and turbine strings are not proposed. Reduced impacts would primarily result from the decrease in viewer duration and increase in viewer distance to construction-related actions.

4.12.3.2 Operations and Maintenance

Visual Contrast

- ***Temple Bar Road*** – Operations and maintenance of Alternative B would result in similar direct impacts to visual resources as those described under Alternative A when viewed from Temple Bar Road; however the duration of time that motorists would observe the Project would be reduced (Figure D-2(e)). The number of turbines in the northwest corner of the Project (west of Squaw Peak) would be reduced by approximately 10 to 30 turbines, thereby increasing the distance to the closest turbine from the entrance to the Lake Mead NRA on Temple Bar Road from 3.9 miles (middleground view) to approximately 7.0 miles (background view). When traveling northbound toward the NRA, travelers would pass the last row of turbines approximately 4.3 miles south of the park boundary (located south of the entrance station), as opposed to 0.4 mile under Alternative A, resulting in a reduction of viewing time from approximately 11 minutes to 6 minutes. The elimination of these turbines would reduce the number of turbines viewed by motorists exiting the NRA, thereby causing the majority of views from Temple Bar Road to be experienced at an oblique angle (toward the southeast).

- ***Lake Mead NRA*** – Operations and maintenance of Alternative B would result in a reduction of direct and indirect impacts to visual resources viewed from the lake and adjacent uplands of the Lake Mead NRA. The reduction in impacts would be primarily due to the removal of 5 to 15 turbines from the northeast portion of the Project Area. The removal of turbines from the northeast portion of the Project Area would be expected to reduce visibility of the proposed Project from the lake and adjacent areas. The nacelle and rotor blades of the remaining turbines situated at lower elevations would still be visible; however, when viewed from inferior (lower elevation areas) such as the lake or shoreline, these structures could be screened by topography and vegetation. Consequently, the portion of the turbines that would be visible would appear small in scale relative to that of the surrounding landscape. Likewise, exposure to synchronized blinking hazard lights would be reduced. Visual contrast in form, line, color, and texture during daylight conditions would be weak (see Figure D-4(c) for simulation of identical view rendered for Alternative C). Although turbines could be seen, they would not attract attention of the casual observer. Visual contrast is not expected to increase to a moderate level during daylight conditions until motorists exiting the NRA pass the entrance to the Park (Figure D-2(e)). Under night conditions, visual contrast from hazard lighting would be expected to vary based on viewer position relative to the turbines in view; however, when viewed from the lake or shoreline, visual contrast would also be expected to be weak, as lighting would not be expected to attract attention of the casual observer from these locations. Perceived visual contrast of hazard lighting against the night sky would increase incrementally for motorists exiting the park via Temple Bar Road.
- ***Traditional Cultural Locations of the Hualapai Tribe*** – Alternative B would include the elimination of approximately 5 to 10 turbines located west of Senator Mountain. Due to the superior viewer position of Senator Mountain, and the broad views of all Project components, visual contrast would not be expected to change under this turbine configuration.
- ***US 93*** – Alternative B would include the elimination of the southern-most turbine string (approximately 10 to 15 turbines) from the proposed Project. Removal of these turbines would increase the distance between US 93 and the closest turbines by 0.4 mile. The level of visual contrast from US 93 is expected to remain strong.
- ***Residential Areas*** – Alternative B would include the elimination of the southern-most turbine string (approximately 10 to 15 turbines) from the proposed Project. Removal of these turbines would increase the distance between the residential areas on Indian Peak Drive by 0.5 mile; however level of visual contrast is expected to remain strong.
- ***Wilderness and Proposed Wilderness*** – Under Alternative B, the distance from the Mount Wilson Wilderness to the closest turbine would be 5.5 miles compared to 4.0 miles with Alternative A. All views from the Wilderness would be in the background zone. Impacts would be similar to those in Alternative A. The distance from the Lake Mead NRA proposed wilderness to the closest turbine would remain the same, however Alternative B would have less impact on the proposed wilderness than Alternative A, particularly because the Wind Farm Site for Alternative B would exclude some of the turbines located on ridgelines that would appear more dominant from views within the proposed wilderness.

Visual Resource Inventory Values

As potential changes to VRI values are not expected to differ across action alternatives, the changes are the same as for Alternative A.

4.12.3.3 Decommissioning

Decommissioning activities would have a similar effect to visual resources as the construction and decommissioning activities of Alternative A. Decommissioning-related impacts would be reduced in the northwest, northeast, and southern portions of the Project Area where turbines and turbine strings are not proposed. The degree to which decommissioning of the Project would restore scenic quality of affected SQRUs would depend on the extent of other development in the area.

4.12.3.4 Project Options

The Project feature options for Alternative B are similar to those of Alternative A, except that the turbine color could be as dark as RAL "Light Grey." This color could be considered to be similar to the dull metallic color of transmission line towers. The following general evaluation of light gray turbines is based on one simulation of a former turbine footprint similar to Alternative A, under side lit conditions, approximately 3.3 miles from one of the KOPs.

The light gray turbines appear to have a stronger contrast for color than white turbines when sky lighted against a light blue sky and against white clouds. The light gray turbines appear to have less of a contrast than the white turbines where backdrop is characterized by the varied colors of landforms and vegetation. Contrast in form, line, color, and texture of white and light gray turbines would be expected to decrease with distance from the viewer, and would vary under different circumstances.

4.12.3.5 Summary of Impacts

In summary, should Alternative B be implemented, direct impacts to visual resources would result from the introduction of structures characterized by strong visual contrast against the existing landscape both day and night from the majority of viewer areas analyzed. Visual contrast and affected views would be similar to that described under Alternative A; however direct and indirect effects to views from Temple Bar Road, and the lake and adjacent uplands of the Lake Mead NRA would be reduced. The reduction in impacts would be primarily due to the removal of turbines from high elevation areas in the northeast portion of the Project Area. Impacts to views from the lake and adjacent uplands in the Lake Mead NRA would be greatest during nighttime conditions. The reduction of impacts to residential areas would be extremely localized and limited to the residence in the northern portion of the viewer area (Indian Peak Road). Prolonged and/or stationary views of Project components from residential areas, traditional cultural locations identified by the Hualapai Tribe, and camping locations on or adjacent to Lake Mead would be most affected. Residential, cultural, and recreational viewer groups in these areas are assumed to have high visual sensitivity. Indirect effects may cause viewers to become less sensitive over time due to reduction in scenic quality. This reduction in scenic quality may also indirectly cause viewers to become more sensitive in other areas within the resource planning unit where the visual integrity of the landscape remains intact.

Although operations and maintenance of the proposed Project is expected to result in a reduction of scenic quality and visual sensitivity of SQRU 41 and SLRU 13, the VRI class assigned to both SQRUs 14 and 41, and SLRUs 65 and 13 would remain a Class C. Operation of the proposed Project under Alternative B would be consistent with VRM Class IV objectives.

4.12.4 Alternative C

4.12.4.1 Construction

Construction of Alternative C would create similar short-term, localized, deviations in landscape character as those described for Alternatives A and B.

4.12.4.2 Operations and Maintenance

Alternative C would have a reduced footprint due to fewer proposed turbines compared to Alternative A, and would occur on approximately 30,178 acres of BLM-administered lands managed by VRM Class IV objectives (Maps 2-2 through 2-10). This alternative would include the elimination of approximately 15 to 30 turbines from the northwest portion of the Project Area, 5 to 10 turbines from the northeast portion of the Project Area, 10-20 turbines from the southern border of the Project Area, and 5 to 15 turbines from the eastern border of the Project Area. The configuration of turbines would be expected to decrease both the visibility of the Project and duration of view to varying degrees when seen from Temple Bar Road and Lake Mead.

Compared to Alternative B, Alternative C would include the addition of approximately 1-5 turbines in the northwest portion of the Project Area, the addition of 1 to 10 turbines in the northeast, the elimination of 1 to 5 turbines in the south, and the elimination of 5 to 10 turbines from the eastern border of the Project Area. The possible variation in the addition of turbines in the northwest and northeast portions of the Project Area compared to Alternative B would not be expected to result in measureable change in impacts when viewed from US 93, Temple Bar Road, and the Lake Mead NRA. Likewise, despite additional reductions in turbines on the southern and eastern borders of the Project Area, visual contrast would not be expected to result in a detectable reduction in impacts when viewed from adjacent residential areas and the traditional cultural locations identified by the Hualapai Tribe.

Visual Contrast

- ***Temple Bar Road*** – Operations and maintenance of Alternative C would result in similar direct impacts to visual resources as those described under Alternative B. When one turbine string is added under Alternative C, the duration of view of motorists heading towards the park would increase from approximately 6 minutes to 7.5 minutes. This additional turbine string would not be expected to substantially change the duration of time that motorists would see the Project when exiting or entering the Lake Mead NRA (Figure D-2(e)). Compared to Alternative A, the duration of time that motorists would see the Project would decrease from 11 minutes to 7.5 minutes.
- ***Lake Mead NRA*** – Operations and maintenance of Alternative C would result in identical direct impacts to visual resources when viewed from the lake or adjacent areas as those described under Alternative B. Compared to Alternative A, there would be a reduction of direct and indirect impacts to visual resources viewed from the lake and adjacent uplands of the NRA.
- ***Traditional Cultural Locations of the Hualapai Tribe*** – Operations and maintenance of Alternative C would result in similar direct impacts to visual resources as those described under Alternative B. There would be a few less turbines near Senator Mountain and Mata Thi:ja, and one string of turbines would be added south and west of Squaw Peak. Compared to Alternative A, there would be similar direct impacts to the three sites.
- ***US 93*** – Operations and maintenance of Alternative C would result in similar direct impacts to visual resources as those described under Alternative B. Compared to Alternative A, there would be the elimination of the northwestern and southern-most turbine strings; however, the level of visual contrast is expected to remain strong.

- ***Residential Areas –*** Operations and maintenance of Alternative C would result in similar direct impacts to visual resources as those described under Alternative B. Compared to Alternative A, the southern-most turbine string would be eliminated; however, the level of visual contrast is expected to remain strong.
- ***Wilderness and Proposed Wilderness –*** Under Alternative C, the distance from the Mount Wilson Wilderness Area to the closest turbine would be 5.0 miles, 1 mile farther than Alternative A, and 0.5 mile closer than Alternative B. The visual impacts would be similar to Alternatives A and B. While the distance from the Lake Mead NRA proposed wilderness to the closest turbine would remain the same as Alternatives A and B, the number of turbines in near proximity to the proposed wilderness with Alternative C would be similar to Alternative B and less than Alternative A.

Visual Resource Inventory Values

As potential changes to VRI values are not expected to differ across action alternatives, the changes are the same as those associated with Alternatives A and B.

4.12.4.3 Decommissioning

Decommissioning of Alternative C would create similar short-term and localized deviations in landscape character as those described for Alternatives A and B.

4.12.4.4 Project Options

The Project feature options for Alternative C are the same as those for Alternative B.

4.12.4.5 Summary of Impacts

In summary, should Alternative C be implemented, direct impacts to visual resources would result from the introduction of structures characterized by strong visual contrast against the existing landscape both day and night from the majority of viewer areas analyzed. Visual contrast and affected views would be similar to those described under Alternative B; however the addition of one turbine string would slightly increase the duration of time that motorists on Temple Bar Road would see the Project when existing or entering Lake Mead NRA. Although operations and maintenance of the proposed Project is expected to result in a reduction of scenic quality and visual sensitivity of SQRU 41 and SLRU 13, the VRI class assigned to SQRUs 14 and 41 and SLRUs 65 and 13 would remain a Class C. Operation of the proposed Project under Alternative C would be consistent with VRM Class IV objectives.

4.12.5 Alternative D – No Action

Under Alternative D, impacts to visual resources resulting from dispersed recreation (i.e., OHV use), livestock grazing, and commercial utility lines would continue. The visual contrast of such activities against the surrounding landscape would be expected to remain weak.

4.12.6 Alternative E – Agencies' Preferred Alternative

Alternative E, the preferred action alternative, would occur on approximately 35,329 acres of BLM-administered lands managed by VRM Class IV objections. On the mid-eastern side and southern sides, the turbine configuration would be similar to Alternative A (see Maps 2-11 to 2-13 in Chapter 2). In the northwest corner of the Project Area, turbines would not be constructed in 11 sections (see Maps 2-11 through 2-13).

4.12.6.1 Construction

Construction of Alternative E (see Maps 2-11 to 2-13) in the northwest corner would have visual effects comparable to Alternative B except that turbines that would have been north of Squaw Peak (T. 29 N, R. 20 W., Section 10 and 15) would be located closer to Lake Mead NRA (Section 2). Compared to Alternative C, the impacts on Lake Mead NRA would be slightly less due to the elimination of one row of turbines southeast of Squaw Peak (Sections 20 and 21). Overall, Alternative E would have slightly less short-term, localized, deviations in landscape character for travelers viewing along Temple Bar Road and slightly more deviations for park visitors who can view the northern end of the Project. Construction-related impacts would be increased along the east and south edges of the Project, compared to Alternatives B and C, primarily due to a decrease in distance to private land from as much as approximately 1.1 miles on the east, and 0.8 miles on the south.

Construction in certain corridors in the northwest corner and along the southern edge of the Alternative E Wind Farm Site could be phased in to meet required nameplate generation. Maps 2-11 to 2-13 depict up to six phases of construction. The last four phases of construction could occur along the south side of the Project and be observed by the local residents. This could increase the duration of impacts in the localized areas depending upon if the southern corridor is needed and which phases of this corridor would be required to meet the nameplate generation capacity. Therefore, the visual impacts along the southern side could be similar to construction activities described under Alternatives A if all phases of Alternative E are required to meet nameplate generation capacity, and would be similar to Alternative B if the southernmost corridor is not needed.

4.12.6.2 Operations and Maintenance

Visual Contrast

- ***Temple Bar Road*** – Operations and maintenance of Alternative E would result in slightly less visual impacts to visitors entering and leaving Lake Mead NRA compared to Alternative C. The closest visible turbine row to the NRA would be relocated approximately one mile farther south. The light gray color of the turbines compared to the white would be slightly less of a color contrast with the darker hills behind them.
- ***Lake Mead NRA*** – Alternative E could result in a slight increase in visual impacts on or near the lake compared to Alternatives B and C. Approximately four turbines would be added at the end of the turbine string closest to a corner of the NRA. The additional turbines when viewed from the lake or shoreline could be screened by topography and large shrubs on the uplands.
- ***Traditional Cultural Locations of the Hualapai Tribe*** – Alternative E would result in a decrease in visual impacts to the northeast and southwest of Squaw Peak due to the relocation of the closest turbines farther away. Around Senator Mountain, the impacts would be similar to Alternative A. The light gray turbines would be slightly less of a color contrast with the darker hills behind them, and with the soil and vegetation as seen from Senator Mountain.
- ***US 93*** – Visual impacts for Alternative E would be similar to Alternative A at the southern end of the Wind Farm Site and Alternative C at the northern end. The gray turbines would be slightly less of a color contrast with the darker background soils, vegetation, and hills.
- ***Residential Areas*** – Alternative E would result in visual impacts to residential areas along the east and south sides of the Wind Farm Site similar to Alternative A. However impacts would be reduced to the private property to the northeast compared to Alternative A due to elimination of approximately eight turbines in Sections 17 and 18 of T. 29 N., R. 19 W. (see Maps 2-11 to 2-13). Light gray turbines would be slightly less of a color contrast with a clear sky, which is the majority of the background from the Indian Peak Road view south of the Project.

- ***Wilderness and Proposed Wilderness*** – Alternative E would result in slightly less visual impacts to Mount Wilson Wilderness compared to Alternative C because the closest turbines would be located approximately one mile farther south from Section 20 to 29 in T. 29 N., R. 20 W. (see Maps 2-11 to 2-13). The visual impacts to the Lake Mead NRA proposed wilderness could possibly result in a slight increase in impacts compared to Alternative B due to the extension of the turbine corridor into Section 2 of T. 29 N., R. 20 W. The gray color of the turbines would be slightly less of a color contrast with the darker soil, vegetation, and clear sky.

Visual Resource Inventory Values

As potential changes to VRI values are not expected to differ across action alternatives, the changes are the same as those associated with Alternatives A, B, and C.

4.12.6.3 Decommissioning

Decommissioning of Alternative E would create similar short-term and localized deviations in landscape character as those described for Alternatives A, B, and C.

4.12.6.4 Summary of Impacts

In summary, should Alternative E be implemented, direct overall impacts to visual resources would be slightly less due to the light gray color of the turbines, which would reduce visual contrast with the surrounding landscape. The visual impacts due to the placement of the turbines would be similar to Alternative A, or B and C, depending upon specific location of the viewer. If the southernmost turbine corridor (phases three through six) is not needed to meet nameplate capacity, the visual effects from the private land and residences south of the Wind Farm Site would be the same as described for Alternative B. If the entire southernmost corridor is required, the visual effects from the private land would be the same as described for Alternative A. If only some of the phases would be required, the long-term visual effects would be lessened for residents to the south when compared to Alternative A.

4.12.7 Mitigation Measures

The proposed Project would implement BMPs as discussed in Chapter 2. These include BMPs from the R*ecord of Decision for the Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments* (BLM 2005b) and are included as Appendix B of this EIS. The BMPs pertaining to visual resources are listed in Table 4-27 in the Assumptions column.

Obstruction lighting is a visual concern because it would cause strong contrast against the night sky. Mitigation to reduce visual contrast resulting from lighting could include an Audio Visual Warning System. Such a system would allow night lighting to remain off, unless an aircraft is detected in close proximity. However, its use has not been approved by the FAA; BLM and Reclamation would consider the use of an Audio Visual Warning System should the FAA approve, based on the requirements listed in Section 4.12.1.9.

Access roads shall be located to follow natural contours and minimize side cuts where feasible to capitalize on opportunities for natural screening by locating roads behind small ridges when doing so would not compromise road engineering constraints, or other resource concerns, and would promote a reduction in impacts on visual resources from frequently seen viewpoints.

4.12.8 Unavoidable Adverse Impacts

Temporary unavoidable adverse impacts to visual resources would result from ground disturbance and the motions of workers, machinery, and Project components related to construction and decommissioning activities. The ground disturbance would be more extensive during construction and decommissioning than during operations. Long-term unavoidable adverse impacts would occur over the duration of the Project to viewers seeking natural landscapes with minimal manmade facilities and disturbances, both during the day and at night. The impacts could be less over time for viewers who become accustomed to seeing the Project and accept it as part of the landscape. The visual impacts would be unavoidable due to the size and number of turbines; however they would be minimized to the extent possible as final designs are prepared with the approval of BLM and Reclamation.

The long-term visual impacts would be reversible and nearly imperceptible when the Project is decommissioned and the land is restored, based on the removal of Project components, restoration of original contours, and the success of revegetation.

4.13 PUBLIC SAFETY, HAZARDOUS MATERIALS, AND SOLID WASTE

This section discusses the potential effects on occupational and public safety and health, use and disposal of hazardous materials, and the presence and disposition of solid waste in the Project Area. Information presented in Section 3.13 of this EIS forms the basis on which potential impacts are assessed. In addition, potential issues associated with public safety, hazardous materials, and solid waste that occurred during the agency and public scoping process are identified and discussed.

4.13.1 Analysis Methods

4.13.1.1 Occupational and Public Safety and Health

The method for analysis of occupational and public safety with regard to the proposed alternatives is to conduct a comparison between the safety conditions that would exist with the adoption of any of the proposed alternatives with the conditions as they currently exist as summarized in the Existing Conditions Section 3.13 of this EIS. Current risks are limited to those naturally occurring situations occurring on native desert land that are encountered during recreational activities, including travel on unpaved roads and desert conditions. Some occupational hazards also currently exist to those individuals who maintain existing transmission lines in the area. With the exception of the No Action alternative, safety hazards under any of the other alternatives would be more likely to exist during construction, operations and maintenance, and decommissioning of the Project and less hazardous situations would be encountered during site monitoring and testing. Risks would also vary when considering occupational safety in terms of workers at and on their way to and from the Project and public safety related to the general public accessing the area.

Typical activities for workers during construction at the Project Area would include establishing site access; excavating and installing the tower foundations; erecting the towers; and constructing the O&M buildings, met towers, electrical substations, and switchyard access roads. Routine maintenance of the turbines and ancillary facilities would occur during operations. In addition to typical risks found at any construction site, some of the typical hazards particularly related to wind farm sites would include working at or around extremely heavy weights of Project components, heights, high winds, energized systems, rotating/spinning equipment, and very high crane lifts of large heavy components. In the presence of any of these hazards, there is a risk of injuries or fatalities. To minimize the risks, workers would be required to adhere to safety standards and use appropriate protective equipment.

As discussed in Chapter 3, a number of mining claims are filed within the study area, but no active mining operations are known to exist in the Project Area (Section 3.13.3.2). One abandoned mine site, known as the Muscovite Mica mine, exists in the northeast portion of the Project Area. No impacts are expected from mines or hazardous materials sites, including abandoned mines, under any of the alternatives. Appendix B outlines BMPs to be followed should hazardous materials be discovered during construction.

As discussed in Chapter 3, the proposed Mohave County Wind Farm is within the endemic valley fever region. The analysis of valley fever impacts considered the amount of dust that would be generated by the proposed Project and the likelihood of increased cases due to the increased risk of exposure to spore-containing dust. Risk is defined as "the probability that an outcome will occur, times the consequence (or level of impact), should that outcome occur." This means that the question in relation to the proposed Mohave County Wind Farm Project is "would the release of fungi occur, and if it does, what would be the expected outcome?" This analysis method was used to determine whether the impacts from valley fever were negligible or minor relative to baseline conditions under the proposed action alternatives.

4.13.1.2 Hazardous Materials and Solid Waste

Potential impacts are assessed in comparison with information gathered during limited site reconnaissance visits on BLM-administered public lands in October 2009 and on Reclamation-administered lands in July 2010. Based on these visits and a regulatory records search, a Preliminary Initial Site Assessment (PISA) was completed. The impacts associated with the Project alternatives have been weighed against the results found in the PISA (URS 2010b). Adherence to Federal, state, and local requirements for handling and disposing of hazardous materials and wastes would apply under all alternatives.

4.13.2 Alternative A – Proposed Action

4.13.2.1 Occupational Safety and Health Impacts

Health and safety issues that would occur under Alternative A would have a direct impact on workers at the site. The greatest impacts would be experienced during construction and decommissioning, but there is also the potential for accidental spills of hazardous materials and worker accidents to occur during operations and maintenance.

Construction

Prior to construction of the Project, a Project HSSE Plan would be developed to address health and safety risks and requirements. Some of the topics that would be addressed in the HSSE Plan would include risk management analysis; emergency response; HSSE planning and procedures; implementation; monitoring and reporting results; setting performance targets; and incident classification, investigation and reporting. The HSSE Plan would also outline minimum health and safety requirements, including the use of personal protective equipment, housekeeping (including adequate sanitation facilities for work crews), maintaining a safe workplace, fire prevention, and safe work practices. The HSSE Plan would also include a risk register, which is a document that is used to identify and mitigate risks as they surface. Continued modification and updating of the risk register is a useful tool to incorporate site specific risks and solutions into the plan (BP Wind Energy 2011a).

Before work commences at the construction site, all work crews would be oriented and trained in various health and safety policies and procedures that are based upon BP Wind Energy policies (BP Wind Energy 2011a), as well as requirements of the Federal Occupational Safety and Health Act (29 USC 651 et seq.) (U.S. Department of Labor [USDL] 2004), and the Arizona Division of Occupational Safety and Health administered by the Industrial Commission of Arizona (USDL 2011).

During construction, blasting may be necessary in order to reach the necessary slope and gradient for Project access roads. This could create a direct, short-term impact on individuals and objects near to the blasting area. Any blasting would be conducted in accordance with a Blasting Plan which would be included in the project HSSE Plan, minimizing the risks associated with worker safety (see Section 2.5.1 of this EIS). All blasting would be designed and carried out by a specialist contractor who has significant experience and expertise in this field and is licensed in the State of Arizona to carry out such work. Every Blasting Plan is unique to its setting, but generally, provisions of the Blasting Plan would include methods to mitigate fly rock, including use of blasting blankets as required. Also, the blast pattern and shot design would be procured from the contractor prior to each blast being made for review and approval of BP Wind Energy. Information on blasting activities would be provided to the owners of any structures within 200 feet of the blast area (BP Wind Energy 2011a).

Trenching or plowing for placement of underground electrical and communication lines would occur as part of the Project installation. These activities could cause a direct, short-term impact during construction. Trenching and installation of underground utilities would be conducted in sections so that the amount of open trenches at a given time is minimized. When trenches are not backfilled, escape ramps for wildlife are recommended to be installed approximately every 147 feet (45 meters) (AGFD 2009c).

The proposed Project would involve construction and soil disturbing activities that could potentially generate fugitive dust and increase the risk of exposure to the fungi that causes valley fever. People working in certain occupations such as construction, agriculture, and archaeology have an increased risk of exposure and disease because these jobs result in the disturbance of soils where fungal spores are found (VFCE 2012). However, as discussed in Section 3.13.3.1, disturbance of soil does not necessarily increase the likelihood of exposure, because the spores are not uniformly distributed in soil. Furthermore, as discussed in Section 4.2, the amount of dust resulting from the Project is expected to be minor, and the implementation of the required BMPs (Appendix B) would minimize dust generated during construction for all action alternatives. Project activities would occur sequentially, which would also minimize the amount of the Project Area that would be disturbed at any given time and reclamation of disturbed vegetation would occur as construction takes place. In addition, only approximately 3 percent of the Project Area would be subject to temporary soil disturbance (Section 4.5.2). As described in Section 4.2.2.1, any dust that is generated in these areas of the site would typically settle close to the source. The Dust and Emissions Control Plan includes measures for reducing the amount of fugitive dust generated through Project activities (BP Wind Energy 2012), and dust suppression measures, as described in Section 4.2.6, would ensure that Project-related particulate emissions comply with existing environmental regulations in the State of Arizona. Based on the expected exposure level, and the mitigation measures described in the referenced Sections in this paragraph, the proposed Project activities are unlikely to increase risk of valley fever over the baseline conditions presented in Section 3.13 under any of the action alternatives. Therefore, the potential impacts of valley fever over baseline conditions are considered minor and would be of short duration during the construction period. Although construction intervals could increase the duration of construction activities, the total extent of soil disturbance would not change and the effects on public health would be the same as previously described if the Project were constructed in a single interval.

Operations and Maintenance

During operations, the HSSE Plan would be adapted to address operational and maintenance activities. Hazards during operations and maintenance activities would be risks associated with working at heights, high winds, and rotating/spinning systems, creating direct, short-term impacts on those individuals exposed to the risks. The International Electrotechnical Commission (IEC) has published minimum safety requirements for wind turbine generator systems (IEC 1999). The IEC requires that the wind turbine generator systems manufacturer provide an operator instruction manual with supplemental information on special local conditions (BLM 2005). The manual would include system safe operating limits and descriptions, start-up and shutdown procedures, and alarm response actions. It would also include an emergency procedures plan identifying probable emergency situations and the actions necessary for operating personnel, including overspeeding, icing conditions, lightning storms, earthquakes, broken or loose guy wires, brake failure, rotor imbalance, loose fasteners, lubrication defects, sandstorms, fires, floods, and other component failure (BLM 2005).

Some maintenance activities could disturb soils, generating fugitive dusts, which could potentially increase the risk of exposure to the fungi that causes valley fever. However, the amount of dust generated by maintenance activities would be far less than those generated by construction activities. The same dust control measures described under construction would apply to maintenance activities. Therefore, maintenance activities are unlikely to increase the risk of valley fever over the baseline conditions presented in Section 3.13.

Decommissioning

Impacts under Alternative A on occupational safety during decommissioning would be very similar to those that could potentially occur during construction. Large equipment would be employed to dismantle the turbines (very heavy component parts) along with the ancillary equipment and buildings. No blasting is planned during decommissioning of the Project. However, should this change, any blasting would be conducted in accordance with the Blasting Plan, and as described in the construction discussion in this section.

The same dust control measures described under construction would apply during decommissioning. Therefore, decommissioning activities are unlikely to increase the risk of valley fever over the baseline conditions presented in Section 3.13.

4.13.2.2 Public Safety and Health Impacts

Construction

During construction of the Project under Alternative A, public safety would be monitored and enforced through installation of signs and fences at and near the Project Area. BP Wind Energy would post safety and warning signs to inform the public of construction activities where the access road enters the Project Area from a public road. Public access to the Wind Farm Site would be monitored and a security guard would patrol the site area during non-working hours. During construction, temporary fences would be erected in those locations where public safety risks exist and where personnel would not be available to control public access (such as excavated foundation holes and electrical collection system trenches). Fences would be installed around laydown areas, areas deemed hazardous, or areas where security or theft are of concern, and would be removed at the completion of the construction period. BP Wind Energy would coordinate the fencing activities and locations with the BLM and/or Reclamation, as appropriate. Fences may also be installed in laydown areas to protect the public from risks associated with the presence of heavy machinery and Project materials. Once operations commence, the Project substation and the Project switchyard would be permanently fenced due to safety risks associated with electrical components and to secure equipment. In addition, the entire completed 5-acre O&M facility would be enclosed by an 8-foot-high chain link fence with barbed wire at the top.

During the construction process, an increased number of slow-moving, oversized heavy vehicles hauling large parts and materials would be traveling on public roads to the Project Area. This could cause temporary delays and potentially cause traffic accidents involving the public, creating a direct, short-term impact. A Transportation and Traffic Plan would be developed to mitigate potential incidents (BP Wind Energy 2013). See Section 4.9 for details concerning information gathered regarding potential transportation impacts. A Transportation and Traffic Plan (BP Wind Energy 2013) developed for the Project used the resulting trip count data to assess the projected impacts against the projected volume of traffic (see Appendix C.2.8).

Additional potential public safety and health impacts could be associated with activities required for construction activities which could have direct, short-term adverse impacts from increased traffic and associated reduced visibility caused by fugitive dust. However, dust palliatives would be used on unpaved road surfaces. While water would be used to suppress dust in most cases, palliatives pre-approved by BLM and/or Reclamation may potentially be used in high-traffic areas. Palliatives that have the potential to affect water quality, such as magnesium chloride, would not be used. The construction of new and reconstructed roads could result in direct, short-term adverse impacts during construction but would later become indirect long-term beneficial impacts on public health and safety by providing improved road conditions and quicker emergency response time to the Project Area.

Because construction activities could potentially generate fugitive dust, there would be an increase to the risk of exposure to the fungi that causes valley fever. People living near or visiting the Project Area could potentially have an increased risk of exposure and disease. However, as discussed in Section 4.3.2.1, the amount of dust resulting from the Project is expected to be minor, and the implementation of the required BMPs (Appendix B) would minimize dust generated during construction for all action alternatives. The proposed Project activities are unlikely to increase risk of valley fever over the baseline conditions presented in Section 3.13 under any alternative. Therefore, the potential impacts of valley fever are consider minor and would be of short duration during the construction period.

Operations and Maintenance

Safety systems have been included in the plans for operation of all of the components of the Project. Each wind turbine would contain a safety system that ensures automatic shutdown of the turbine in the event of any mechanical disorders, excessive vibration, grid electrical faults, or loss of grid power. If grid electrical faults or loss of grid power occurs, the turbines would automatically return to service when the disorder is remedied. In the event of a mechanical disorder, the turbines would remain shut down until the disorder is identified and remedied by the Project operations and maintenance team.

In the past, a rare but possible risk was the occurrence of a rotor blade breaking and parts being thrown off the turbine. This typically occurred as a result of rotor overspeed or material fatigue (Hau 2005). Modern turbines generally have lower rotor speeds (18 to 20 revolutions per minute) and better braking systems than the turbines previously produced. Blade design and manufacture has also improved tremendously. Consequently, the risk of rotor breakage is considered negligible due to design and manufacture improvements. Under the BP Wind Energy plan, no turbine on public land would be positioned closer than 1.5 times the total height of the wind turbine (from 585 to 740 feet) to the ROW boundary (BP Wind Energy 2011a), further reducing the risk to nearby residents.

The physical obstruction of a wind turbine itself and the effects on communications, navigation, and surveillance systems, such as radar are two primary aviation safety considerations in the development of a wind project (Department of Trade and Industry ([DTI]) 2002). BP Wind Energy would work with the FAA to determine lighting requirements for the wind turbines. A preliminary analysis has been completed and the FAA has determined that if the turbines are a white or light off-white color, a portion of them would be required to be lit at night with red synchronized lights. The Kingman Airport and Industrial Park is located approximately 50 miles from the Project Area, a distance at which the potential for accidental impacts between small aircraft and the wind turbines is considered slight. Night lighting of the turbines would not present an impact to aviators flying to and from Triangle Airpark, located approximately 0.5 mile northeast of White Hills Road and US 93, because the airpark is limited through FAA visual flight rule to day-use only. However there would be an increased risk for accidental impacts due to the proximity of the airpark to the Wind Farm Site. Risks could be mitigated through standard airfield operating procedures to direct aircraft away from the turbines until an adequate flight altitude is obtained to safely clear the Wind Farm Site, but an increased risk of mishaps would remain for aircraft experiencing a flight emergency in close proximity to the turbines.

The presence of dry vegetation combined with high winds could produce a potential fire hazard around the Project Area during operations and maintenance. Electrical shorts, insufficient equipment maintenance, contact with power lines, wildlife interference, or lightning also could potentially be the cause of a fire. At the Project, the wind turbines would be equipped with built-in fire prevention measures that allow the turbines to shut down automatically before mechanical problems could create excess heat or sparks. Also, the use of underground power collector cables would reduce the risk of fire from short circuits caused by wildlife or lightning. Water carrying trailers (water buffaloes) with a capacity to carry 500 gallons of water would be positioned around the site at appropriate locations for response in the event of a fire. Training for employees and local fire personnel would be conducted to alert all to the safety risk and the appropriate responses (BP Wind Energy 2011a).

Some maintenance activities could disturb soils, generating fugitive dusts, which could potentially increase the risk of exposure to the fungi that causes valley fever. However, the amount of dust generated by maintenance activities would be far less than those generated by construction activities. The same dust control measures described under construction would apply to maintenance activities. Therefore, maintenance activities are unlikely to increase the risk of valley fever over the baseline conditions presented in Section 3.13.

Decommissioning

Under Alternative A, the risks to public health and safety during decommissioning would be similar to those encountered during construction. Public safety would be monitored and enforced through use of signs and fences at and near the Project Area. Safety and warning signs would be posted by BP Wind Energy to inform the public of ongoing decommissioning activities. During the decommissioning process, a number of slow-moving, oversized heavy vehicles hauling large parts and materials away from the Project Area would be traveling on public roads. This could cause temporary delays and potentially cause traffic accidents involving the public, creating a direct, short-term adverse impact. The Transportation and Traffic Plan would be modified to mitigate potential incidents that could occur during decommissioning (BP Wind Energy 2011a).

Public access to the site would be monitored and a security guard would patrol the site area during decommissioning. Temporary fences would be erected in those locations where public safety risks exist due to disturbed area conditions or the presence of heavy equipment and where personnel are not currently working. Fences may also be installed in other areas to protect the public from risks associated with the presence of heavy machinery and discarded equipment. Temporary fencing would likely consist of chain link fences, with the height and design varying according to the location and level of risk.

The same dust control measures described under construction would apply during decommissioning. Therefore, decommissioning activities are unlikely to increase the risk of valley fever over the baseline conditions presented in Section 3.13.

4.13.2.3 Hazardous Materials and Solid Waste

Construction

The use of hazardous materials during construction of the Project could create a direct, short-term risk to those individuals handling and using the materials. Hazardous materials are those chemicals listed in the USEPA Consolidated List of Chemicals Subject to Reporting under Title III of the Superfund Amendments and Re-authorization Act of 1986 (SARA 1986). Hazardous materials as well as non-hazardous solid wastes such as oils and lubricants are managed under the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. §6901 et seq. [1976]). RCRA gives the USEPA the authority to control hazardous waste from its generation through its transportation, treatment, storage, and finally its disposal.

Hazardous materials anticipated being used or produced for this Project would include:

- Lubricants: grease (potentially containing complex hydrocarbons and lithium compounds, and motor oil
- Fuels: gasoline (potentially containing benzenes, toluene, xylenes, methyl-tert-butyl ether, and tetraethyl lead), and diesel fuel
- Combustion emissions: nitrogen oxide, carbon monoxide, and methane hydrocarbons
- Transmission line emissions: ozone and nitrogen oxide
- Explosives

All production, use, storage, transport and disposal of hazardous materials related to this Project during construction would comply with all applicable Federal, state and local laws and regulations. All regulations regarding any toxic substances that are used, generated by, or stored at the Project Area would be followed in accordance with the Toxic Substances Control Act of 1976, as amended (15 U.S.C.2601, et seq.; TSCA 1986). Additionally, any release of toxic substances in excess of the reportable quantity established by 40 CFR, Part 117 would be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA 1980). The SPCC rule, which includes requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines, would be followed. The rule requires specific facilities to prepare, amend, and implement SPCC Plans. The SPCC rule is part of the Oil Pollution Prevention regulation, which also includes the Facility Response Plan (FRP) rule.

The use of explosives could occur during construction to establish roads and other construction requirements. Use of explosives would be performed in compliance with the HSSE Plan.

Two batch plants would be constructed to supply high strength concrete for the wind turbine foundations and ancillary facility footings and slabs. Power at these plants, if not through a new distribution line, would most likely be provided by temporary generators. The generators at these plants would be equipped with secondary containment to reduce the risk of accidental spills reaching the ground. If oil or grease is spilled or leaked from equipment, the contaminated sand would be removed and hauled to Silver State Disposal in Clark County, Nevada, which is an approved hazardous material dump. Used oil would be pumped into a truck and hauled to a recycling facility in Las Vegas, Nevada on an as needed basis.

Cement and a mixture of products would be stored in silos located adjacent to the mixing plant. Concrete transit-mix trucks would be cleaned at a location specifically identified in the site-specific SWPPP that would be prepared prior to Project commencement, reducing the risk of potential groundwater contamination (BP Wind Energy 2011a).

Operations and Maintenance

Operation of the turbines would require the use of lubricants and oils. Turbines typically use four types of lubricating oils and greases, none of which are listed as hazardous by the USEPA. The nacelle of the wind turbines would house a generator and gearbox. Each wind turbine generator would contain approximately 50 gallons of a glycol-water mixture, 85 gallons of hydraulic oil, and 105 gallons of lubricating oil. The lubricating oil would be checked quarterly and filled as needed. Waste oil would be removed from the site by a certified waste contractor (BP Wind Energy 2011a). Because of the leak detection and containment systems designed into the turbine generators, there would be little risk of accidental spills of these materials. As with activities occurring during construction, all SPCC rules would be incorporated into the FRP during operations and maintenance.

Limited quantities of lubricants, cleaners, and detergents would be stored at the O&M Building. In addition, a minimum of two 55-gallon drums of virgin oil used for continuing maintenance of the wind turbines would be stored on a secondary containment pallet inside the building, minimizing the potential for accidental spills. Waste fluids would also be stored at the O&M building, but only for a short time during Project operations.

No fuel for construction vehicle refueling would be stored on site during operations and maintenance. However, as construction and other vehicles access the site, there would be a slight risk of drips or leaks occurring from routine use of these vehicles. Combustion emissions from construction vehicles would occur, but the construction equipment and vehicles and the O&M trucks would be maintained at all times to minimize leaks of motor oils, hydraulic fluids, and fuels. Vehicle maintenance would be performed off-site. Any chemicals, fuel, and oil located in the Lay-down/Staging Area or the O&M facility would be located in areas that provide for containment of spilled fluids (BP Wind Energy 2011a).

Power generated from the turbines would be fed through a breaker panel at the turbine base inside the tower that is interconnected to a pad-mounted transformer. The 34.5-kV transformer foundation would be a concrete pad placed over compacted soil or granular material. Each pad-mounted transformer would contain approximately 500 gallons of mineral oil used to aid in cooling the electrical components located within the box. Leak detection and containment systems have been engineered into the design of these transformers. Each transformer undergoes an inspection prior to placement on the pad and is inspected during operations. As a result, potential for accidental spills resulting from malfunction or breach of the transformers is low. No polychlorinated biphenyls (PCBs) would be used in transformers on this Project (BP Wind Energy 2011a).

The generated electricity from the turbines would travel via collector lines to the substation where a larger transformer would be housed. Each substation transformer would contain approximately 12,000 gallons of mineral oil for cooling. The substation transformers would have a specifically designed containment system to minimize the risk of accidental fluid leaks (BP Wind Energy 2011a). Given this, the potential for discharge to the environment would be considered slight.

Transmission line emissions of ozone and nitrogen oxide could occur, but these emissions would be produced in minute amounts, and would not produce a significant discharge to the environment.

Routine maintenance on the pad-mounted transformers and substation would be conducted every six months, and would consist of oil checks, verification of trip settings, and tightening of connections in accordance with the manufacturer's maintenance recommendations (BP Wind Energy 2011a).

Some generation of solid wastes would occur during construction; however, careful estimation of needed materials would minimize the generation of wastes at the site. When feasible, wastes generated during construction would be recycled. Materials that could be recycled include steel, wood, and paper. These materials would be sorted and stored in dumpsters for ultimate transport to a regional landfill that provides recycling services. Non-recyclable materials, such as concrete waste, would be collected and transported to the regional landfill by a contracted waste management company (BP Wind Energy 2011a). These measures would reduce the possibility of contamination from waste materials.

Decommissioning

Under Alternative A, the risks of exposure to hazardous materials and wastes by workers and the public during decommissioning would be similar to those encountered during construction. Appropriate handling procedures in compliance with all Federal, state, and local requirements in place at the time would be followed. Removal of maintenance oils and lubricants would occur as the turbines were dismantled and removed, and all other hazardous materials would be removed from the site using standard procedures for removal and disposal.

With the largest footprint and the greatest amount of wind turbines scheduled for construction, Alternative A presents the most risk to public and worker safety, exposure to hazardous materials and wastes, and solid waste. However, based on planned safety measures, worker training requirements, and compliance with Federal, state and local requirements, the impact of the Project on the public and workers would be minimal over the life of the Project.

4.13.3 Alternative B

Under Alternative B, the Project footprint would be reduced to approximately 30,872 acres of BLM-managed land and approximately 3,848 acres of Reclamation-managed land. Because of the reduced acreage, the number of wind turbines constructed under this alternative would be anticipated to be reduced to approximately 166 to 208 turbines, depending on the turbine size chosen. Therefore, the potential for occupational injuries, public safety incidents, public health risk of contracting valley fever, accidental spills of hazardous materials and wastes, and solid waste dumping would be reduced proportionally from Alternative A.

4.13.3.1 Occupational Safety and Health Impacts

Construction

With fewer turbines being constructed for this alternative (estimated at up to 75 fewer than Alternative A) and fewer ancillary buildings being built, it is anticipated that the time spent by workers needed on site would be reduced accordingly. This reduction would be greater on the Reclamation-managed land where approximately 60 fewer turbines would be erected. Additionally, based on planned safety measures and worker training requirements, the impact of the Project on the public and workers would be less than Alternative A. Overall, impacts on workers would be minimal over the life of the Project. Under Alternative B, the potential risk of contracting valley fever would also be less than described under Alternative A.

Operations and Maintenance

Approximately 75 fewer turbines would be installed under Alternative B as compared with those planned for installation under Alternative A. This would proportionately reduce the need for the amount of maintenance activities required to maintain the fewer number of turbines and supporting equipment. However, the equipment is designed to require little hands-on maintenance, which results in only a slight difference between the maintenance required between Alternatives A and B.

The same dust control measures described under construction would apply during the operations and maintenance. Therefore, decommissioning activities are unlikely to increase the risk of valley fever over the baseline conditions presented in Section 3.13.

Decommissioning

As with construction for Alternative B, fewer turbines would need to be decommissioned, and less equipment would be needed to remove turbine components. This would take workers less time than what would be needed for Alternative A. In any case, precautions would be taken to alert the public regarding the use of heavy, slow-moving equipment emerging from the Project Area and traveling along main thoroughfares. A slightly less short-term adverse impact would result in decommissioning under Alternative B, though the differences would be minimal.

The same dust control measures described under construction would apply during decommissioning. Therefore, decommissioning activities are unlikely to increase the risk of valley fever over the baseline conditions presented in Section 3.13.

4.13.3.2 Public Safety and Health Impacts

Construction

The same preventative measures used for Alternative A would be implemented under Alternative B to ensure the safety and health of the public during the construction of the Project.

Operations and Maintenance

During operations and maintenance, the public would continue to be protected by means of informational signage and fencing. Activity outside of the Project Area, particularly along the roadways, would be reduced from that experienced during construction. Based on the smaller footprint of this alternative, the risk of injury or exposure to valley fever fungi to the public would be reduced proportionately from Alternative A.

Decommissioning

As with all alternatives, BP Wind Energy would follow the directives of the Transportation and Traffic Plan to provide appropriate signage and traffic control to remove large equipment along local roadways during the decommissioning process. With fewer turbines to dismantle, there would be fewer trips to remove the equipment, but this volume would not be substantial.

4.13.3.3 Hazardous Materials Impacts

Construction

During construction for Alternative B, fewer turbines would be installed than would occur under Alternative A. A certain amount of hazardous materials and solid wastes would be used during installation of the turbines, but given the strict requirements for handling and maintenance of these materials under RCRA guidelines, and the thorough training provided to the workers, there is no indication that any different risks identified for Alternative A would be encountered.

Operations and Maintenance

As previously mentioned, operation of the turbines requires the use of lubricants and oils. The turbines typically use four types of lubricating oils and greases, none of which are listed as hazardous by the RCRA.

Strict rules listed in RCRA dictate the use and disposal methods of hazardous materials, therefore the difference in impact from Alternative A would only be slight due to the smaller footprint of Alternative B.

Decommissioning

Since fewer turbines would be erected, decommissioning of the turbines at the conclusion of the Project would be slightly smaller for Alternative B than for Alternative A. However, by following the guidance provided in the Transportation and Traffic Plan, no substantial difference in the decommissioning efforts between Alternatives A and B should occur.

4.13.4 Alternative C

4.13.4.1 Occupational Safety and Health Impacts

Construction

As with Alternative B, the Project footprint for Alternative C would be reduced similarly from that proposed for Alternative A. While the acreage and number of turbines would be similar to Alternative B, the planned placement of the turbines would differ and would be shifted to provide a greater separation between the private lands and the nearest turbines. Generally the same number of turbines would be installed as Alternative B, and the location of the installation would have little or no impact on worker safety or health, so the impact would be about the same for Alternative C as Alternative B.

Operations and Maintenance

Under Alternative C, the risks experienced by workers at the Project Area would be the same as Alternative B.

Decommissioning

Alternative C would have little or no difference in risks to workers at the Project Area as Alternative B.

4.13.4.2 Public Safety and Health Impacts

Construction

Alternative C would have the same number of turbines constructed as with Alternative B, and the impacts would be the same.

Operations and Maintenance

From a public safety perspective, the greater distance between private lands and turbines would offer a greater separation from the risk of exposure to the hazards associated by turbines. The risk includes a small potential for leaked lubricants and cooling oils, and the rare risk of a broken rotor blade or other component being thrown from a turbine. From a public health perspective, the risks of exposure to fungi carrying valley fever would the same as under Alternative B.

Decommissioning

Impacts from decommissioning under Alternative C would be the same as under Alternative B because precautions would be taken to alert the public regarding the use of heavy, slow-moving equipment emerging from the Project Area and traveling along main thoroughfares.

4.13.4.3 Hazardous Materials Impacts

Construction

Based on the similar number of turbines and ancillary equipment that would be constructed, the use of hazardous materials and production of solid waste during construction would be similar for Alternative C as it would be for Alternative B.

Operations and Maintenance

During operations and maintenance for Alternative C, activities involving the use of hazardous materials would be similar to those encountered under Alternative B. Based on the strict requirements for handling and maintenance of these materials as defined by the USEPA under RCRA, and training provided to the workers, no additional risk would be encountered than found under either Alternative B or A.

Decommissioning

As experienced with construction and operations for Alternative C, strict requirements and training for the handling and maintenance of hazardous materials would be observed, making the risk the same as found under Alternative B.

4.13.5 Alternative D – No Action

Under Alternative D, the wind energy Project would not be developed and the public health and safety environment would remain the same as it currently is described in Section 3.13. There would be no adverse impacts on health and safety from Project construction, O&M, and decommissioning activities because the Project would not occur. In addition, no associated new sources of hazardous materials or solid wastes would be introduced to the Project Area. Impacts would continue to be related to current available access to the area and the associated opportunity for illegal dumping or accidental petroleum product releases from vehicles. The continuation of existing impacts and management guidelines would continue as they are directed in the Kingman RMP. Because the Project Area is located within the valley fever endemic region, the risk of exposure to valley fever exists under the no action alternative (see Section 3.13). None of the proposed Project Alternatives is expected to increase the risk of exposure over existing conditions.

4.13.6 Alternative E – Agencies' Preferred Alternative

Under Alternative E, the Project footprint would be reduced to approximately 35,329 acres of BLM-managed land and approximately 2,781 acres of Reclamation-managed land. Because of the reduced acreage, the number of wind turbines constructed under this alternative would be anticipated to be reduced to approximately 179 to 243 turbines, depending on the turbine size chosen. Therefore, the potential for occupational injuries, public safety incidents, public health risk of contracting valley fever, accidental spills of hazardous materials and wastes, and solid waste dumping would be reduced proportionally from Alternative A.

4.13.6.1 Occupational Safety and Health Impacts

Construction

With fewer turbines being constructed and fewer ancillary buildings being built than assessed under Alternative A, it is anticipated that the time spent by workers needed on site would be reduced accordingly. This reduction would be greater on the Reclamation-managed land. Additionally, based on planned safety measures and worker training requirements, the impact of the Project on the public and workers would similar to Alternative B. Overall, impacts on workers would be minimal over the life of the Project. Under Alternative E, the potential risk of contracting valley fever would also be less than described under Alternative A as there would be approximately 303 fewer acres of temporary disturbance. Phasing construction to meet nameplate generation could decrease the extent of temporary soil disturbance. The effects on public health would be the same as previously described; however, the decrease in soil disturbance could decrease the risk of contracting valley fever.

Operations and Maintenance

Impacts from Alternative E from maintenance activities required to maintain the fewer number of turbines and supporting equipment would be similar to Alternative B.

The same dust control measures described under construction would apply during operations and maintenance. Therefore, operations and maintenance activities are unlikely to increase the risk of valley fever over the baseline conditions presented in Section 3.13.

Decommissioning

Impacts from Alternative E from activities required to decommission the fewer number of turbines and supporting equipment would be similar to Alternative B.

The same dust control measures described under construction would apply during decommissioning. Therefore, decommissioning activities are unlikely to increase the risk of valley fever over the baseline conditions presented in Section 3.13.

4.13.6.2 Public Safety and Health Impacts

Construction

The same preventative measures used for Alternative A would be implemented under Alternative E to ensure the safety and health of the public during the construction of the Project. Under Alternative E, and similar to Alternatives B and C, the opportunity for accidents involving the public would be reduced compared to Alternative A.

Operations and Maintenance

Impacts from Alternative E from maintenance activities required to maintain the fewer number of turbines and supporting equipment would be similar to Alternative B. Alternative E would have light gray turbines, comparable to RAL 7035, used throughout the Project. The light gray color is expected to result in less visual contrast than a white turbine, while meeting the FAA's requirements for marking and lighting. Use of this color would eliminate the requirement to lite a portion of the turbines with red synchronized lights, and would remove the potential for accidental impacts between small aircraft and the wind turbines discussed in Section 4.13.2.2.

Decommissioning

Impacts from Alternative E from activities required to decommission the fewer number of turbines and supporting equipment would be similar to Alternative B.

4.13.6.3 Hazardous Materials and Solid Waste

Construction

The same preventative measures for handling and maintenance of hazardous materials and solid wastes used for Alternative A would be implemented under Alternative E; there is no indication that any different risks identified for Alternative A would be encountered.

Operations and Maintenance

Strict rules listed in RCRA dictate the use and disposal methods of hazardous materials. Therefore, impacts from Alternative E from maintenance activities required to maintain the fewer number of turbines and supporting equipment would be similar to Alternative B.

Decommissioning

Impacts from Alternative E from activities required to decommission the fewer number of turbines and supporting equipment would be similar to Alternative B.

4.13.7 Mitigation Measures

Mitigation measures previously discussed in this section regarding occupational and public safety, and the presence and handling of hazardous materials/waste and hazardous and solid waste would be completed in the event the Project is implemented. All construction, operation, and decommissioning activities would be conducted in compliance with applicable Federal and state occupational safety and health standards. Additional mitigation measures associated with Project implementation are listed below.

- A safety assessment would be conducted to describe potential safety issues and the means that would be taken to mitigate them. This would include preparation of an HSSE Plan that addresses safety issues related to workers and the public.
- Additional plans should be prepared including a site-specific SWPPP, Blasting Plan, Transportation and Traffic Management Plan, HSSE Plan, SPCC Plan, Dust and Emissions Control Plan, and Integrated Reclamation Plan. These plans would include elements that contribute to a maintaining a safe environment and/or minimizing the potential for adverse health effects associated with dust or pollutants in water, and other safety and operations plans as needed.
- Local planning authorities would be consulted regarding increased traffic issues during construction and decommissioning.
- The Project would comply with FAA regulations, including use of lighting requirements to warn aviators of obstructions (FAA 2007).
- A fire management and response strategy to minimize the potential for a fire and to promptly extinguish fires would be developed.

4.13.8 Unavoidable Adverse Impacts

Unavoidable adverse impacts affecting health and safety would occur if the safety rules and regulations were not observed, resulting in severe injury or loss of life to a worker or member of the public.

With regard to hazardous materials, hazardous wastes, and solid waste, unavoidable adverse impacts could occur if an accidental spill were not properly addressed according to Federal, state, or local requirements as defined under RCRA and the SPCC rule.

4.14 MICROWAVE, RADAR, AND OTHER COMMUNICATIONS

Wind turbines are known to potentially cause interference with microwave communications and radar systems. This section provides a discussion of the analysis of the extent of this potential interference due to the Project, as well as possible mitigation measures. The analysis provided in this section addresses only operations and maintenance of the Project because the blades of a turbine in motion would be the only cause of impacts to microwave, radar, or other communication paths. The blades would not be operating during construction and decommissioning. After a 45-day period of review, no Federal agencies identified any concerns regarding blockage of their radio frequency transmission. An early turbine layout was submitted to the FAA for review, and Determinations of No Hazard to Air Navigation were issued for all turbine locations in January 2011. The Determinations are due to expire in July 2012. Due to the addition or relocation of turbines since that time, a revised turbine layout has been submitted to the FAA for review, and new Determinations issued for the added or relocated turbines. For those remaining Determinations set to expire in 2012 prior to Project construction, the Project would file an extension request or, if necessary, resubmit the entire Project to the FAA. The analysis area is all known radar and microwave communication facilities within 50 miles of the Project Area.

4.14.1 Analysis Methods

Microwave

A microwave study for the Project was conducted by Comsearch on August 25, 2011 (Comsearch 2011) (see Appendix E) to determine the potential for the Project to interfere with privately operated microwave beams under all of the action alternatives. The study identified 13 microwave beams near the Project Area. Additionally, the Project proponent has requested the National Telecommunications and Information Administration (NTIA), which overseas Federal communication resources, to provide a review of the Project. The October 28, 2011 response from the NTIA indicates that after a 45-day period of review, no Federal agencies identified any concerns regarding blockage of their radio frequency transmissions. Any wind turbine that would potentially interfere with these microwave communication resources would require relocation or elimination from the Project.

Microwave beams are used to transmit television, radio or other communication signals. Wind turbines can interfere with microwave paths by physically blocking the line-of-sight between two microwave transmitters. Additionally, wind turbines have the potential to cause blockage and reflections (ghosting) to television reception. Blockage is caused by the physical presence of the turbines between the television station and the reception points. Ghosting is caused by multipath interference that occurs when a broadcast signal reflects off of a large reflective object, in this case a wind turbine, and arrives at a television receiver delayed in time from the signal that arrives via direct path.

Radar/Air Traffic

The Project Area has been analyzed using the Department of Defense (DOD) Preliminary Screening Tool (Appendix F) for long-range radar (LRR), weather surveillance radar-1988 Doppler radars (NEXRAD), and military operations. The wind turbines proposed for this Project would be a maximum of 499 feet (152.1 meters) total blade height above existing grade and would need to comply with Federal Aviation Regulations (FAR) Part 77 (FAA 2010c).

Radar is used for several important purposes including real-time tracking for air traffic controllers of military and civilian aircraft, supporting homeland security missions, and monitoring of weather systems. Historically, there has been concern about potential interference between wind turbines and radar operations. Wind turbines can create what is known as “turbine clutter,” a phenomenon that occurs when radar signals are bounced off of the moving blades and other parts of the turbines and create false signals that appear as a blacked out area on radar. It is difficult to track planes through “turbine clutter.” On Doppler (weather) radar the “turbine clutter” is translated as a storm.

4.14.2 Alternative A – Proposed Action

Microwave

The microwave study was intended for preliminary planning purposes only and the actual proposed wind turbine locations were not provided to Comsearch at the time of the study. Study results identified 13 microwave beam paths near the Project Area. However, wind turbines under all action alternatives have been sited to avoid the identified microwave beam paths. Because the wind turbines would not be located in areas that would result in microwave interference, there would be no impact to microwave communications.

Radar/Air Traffic

For LRR, NEXRAD, and military operations, the analysis indicates that the Project Area is classified as "green," meaning that the Project is not likely to cause an impact with National Air Defense and Homeland Security Radars, weather radars, or military operations. Regardless of the results of this preliminary screening, any object that is more than 200 feet in height (such as wind turbines) can create a hazard to navigable airspace. An aeronautical study was prepared in accordance with FAR Part 77 and resulted in a No Hazard Determination for each proposed wind turbine under all action alternatives, based on the alternatives as they were configured at the time of this coordination. Aeronautical studies yielded a Determination of No Hazard for each proposed wind turbine and determined that the wind turbines should be white and have synchronized red lights. Since the FAA is required to coordinate with the military as part of the No Hazard Determination process, and no concerns were raised, there would be no impact expected to radar or military operations.

Any change to the location or height of the determined wind turbines would require the submittal of the change to the FAA, completion of a new aeronautical study, and the issuance of a new Determination of No Hazard for each changed wind turbine site.

4.14.3 Alternative B

The selection of Alternative B would not result in different impacts than those noted above for Alternative A.

4.14.4 Alternative C

The selection of Alternative C would not result in different impacts than those noted above for Alternative A and Alternative B.

4.14.5 Alternative D – No Action

Under the No Action Alternative, the proposed Project would not be built and the proposed Project Area would remain undeveloped. There would be no risk of interference with microwave beams or radar (including military, airport and weather radar) since the proposed wind turbines would not be installed. Likewise there would be no impact to navigable airspace.

4.14.6 Alternative E – Agencies' Preferred Alternative

The selection of Alternative E would not result in different impacts than those noted above for Alternative A, B, or C.

4.14.7 Mitigation Measures

No adverse impacts have been identified, therefore no mitigation measures are required beyond those commitments incorporated into the Project as described below:

- Wind turbines would be relocated or eliminated from the Project as necessary to avoid the 13 microwave beams that are near the Project Area.
- Relocated wind turbines, if any, would be submitted to the FAA for review and require the issuance of new Determinations of No Hazard.

- Wind turbines would be marked with synchronized obstruction warning lights as required by the FAA Determination of No Hazard and FAA Advisory Circular 70/7460-1K (FAA 2007).

4.14.8 Unavoidable Adverse Impacts

No unavoidable adverse impacts to microwave, radar, and air traffic have been identified for the Project.

4.15 NOISE

The following section describes the assessment of temporary predicted noise impacts due to Project construction and decommissioning, and long-term predicted noise impacts due to operations and maintenance. For explanation of acoustical terminology that is used in this analysis, the reader should refer to Section 3.15.1.1. A technical report titled "Noise and Vibration Study, Mohave County Wind Farm Project" (abbreviated in this section as NVS) (URS 2012), which is available upon request at the BLM Kingman Field Office, provides additional detail on the description of analysis methodologies and presentation of predicted results summarized in this section.

4.15.1 Analysis Methods

The noise assessment for the Project was based on indicators for noise impact assessment that are typically absolute or relative threshold criteria, established by applicable laws, ordinances, and regulations. Relevant guidance can also provide the basis for reasonable indicators as described in the following paragraphs.

Noise Levels

Section 3.15.1.1 of this EIS describes the Federal, state and local (i.e., Mohave County, Arizona) guidance and regulations that define thresholds for acceptable Project noise levels. In summary, and according to the Mohave County Zoning Ordinance, Project operation noise up to 70 dBA during the day and 63 dBA at night is legally permitted. Construction noise is excluded from these limitations. However, in remote rural settings such as those that represent the Project Area and its surroundings, a lower guidance threshold based on probability of causing human listener annoyance (or possibly sleep disturbance at night) might be more appropriate when assessing potential noise impact. Hence, and as introduced in Section 3.1.1.1 of the NVS, sound levels of 45 dBA L_{eq} (based on 8-hour period) and 55 dBA L_{dn} are two suggested guidance indicators for private lands (either currently occupied or planned as residential uses) in the Project noise analysis study area, corresponding with World Health Organization (WHO) and USEPA guidelines, respectively. The more stringent of these two, 45 dBA L_{eq} (8-hour) is used in this impact assessment.

For Lake Mead NRA lands in the Project noise analysis study area, such as those that abut the northern boundary of the Project in Alternative A, Section 3.15.1.2 states that a guidance-based nighttime Leq of 35 dBA would apply. This kind of limit is known as a fixed or absolute criterion, and is different from what might be the application of a relative criterion to define noise level thresholds, like those set forth in OAR 340-035-0035, that vary with the background sound level. Table 4-28 below shows this difference in terms of what the anticipated future ambient (i.e., Project noise added to the non-Project background) may become. The presented background sound levels in Table 4-28 are based on an analysis of NPS LAKE018 survey sound data, correlated to concurrent available wind speed data at prospective turbine hub height. The table indicates that when the hub height wind speed increases, the wind speed at ground level (where NPS was measuring sound level) appeared to proportionately increase as well and thus generate higher background noise.

Table 4-28 Comparison of Project Noise Assessment Methods Using Wind Measured at Hub Height and LAKE018 Sound Data

Hub height wind speed (m/s)	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Nighttime background sound at ground level (from analysis, regression of NPS data)	27	29	31	33	35	37	39	41	42
NPS recommended threshold – **absolute 35 dBA nighttime Leq for Project Noise**									
Project noise	35	35	35	35	35	35	35	35	35
Future ambient	36	36	36	37	38	39	40	42	43
Increase over existing non-Project ambient (background)	9	7	5	4	3	2	1	1	1
Hypothetical potential threshold – **allowable increase over ambient = 10 dBA, with 50 dBA future ambient cap**									
Project noise	36	38	40	42	44	46	48	49	49
Future ambient	37	39	41	43	45	47	49	50	50
Increase over existing non-Project ambient (background)	10	10	10	10	10	10	10	9	8

Using the NPS recommended fixed criterion of 35 dBA Leq nighttime for Project noise over Lake Mead NRA lands, the increase over existing ambient sound level diminishes as the non-Project background sound rises. When background sound is relatively low, the future ambient stays close to 35 dBA. When background sound is high, the Project noise has less acoustical contribution to the future ambient. Above 9 mps, Table 4-28 suggests that, with a difference of only 1 dBA, it may be difficult to discern the Project noise from the background sound.

On the other hand, Table 4-28 shows that usage of a relative criterion like "ambient + 10 dBA" would allow Project noise to dominate the ambient soundscape across the range of hub-height wind speeds and exceed 45 dBA Leq above 8 mps, where turbines are expected to operate at full power-generating capacity. While 45 dBA Leq might be considered an outdoor sound level compatible with sleep for someone inside a building, overnight campers at Lake Mead NRA are unlikely to have the noise-reduction benefit of a structure and would thus be directly exposed to Project noise.

Thus, and because it also avoids the relative criterion need to define both the background sound level and the time period over which it should be assessed, the absolute guidance-based criterion of 35 dBA nighttime Leq is used in this EIS analysis as an impact indicator with respect to Lake Mead NRA lands in the Project study area.

Noise Levels for Wildlife

There are no Federal guidelines for determining acceptable sound or vibration levels for terrestrial wildlife. While human-caused sound can affect wildlife, such effects vary with several factors that include the species of the fauna under consideration, its sensitivity, habituation to noise disturbance, and the characteristics and duration of the disturbance. Research to identify and support the establishment of applicable and/or acceptable noise thresholds with respect to wildlife is ongoing.

Lacking an established numerical threshold, for purposes of this analysis one might generally and anthropomorphically attribute human noise sensitivity to wildlife in the Project study area. Thus, for fauna on Lake Mead NRA land, a guidance-based impact indicator might be the same 35 dBA L_{eq} (9-hour) nighttime threshold from Project noise as analyzed for human receivers in the park. For wildlife that have habituated to the human presence and associated noise and inhabit private lands in the Project study area with some degree of human occupancy or residential usage, a guidance-based indicator might be the same 45 dBA L_{eq} (8-hour) from Project noise as suggested for these lands with respect to human receivers.

4.15.1.1 Methods and Assumptions

The analysis area for noise includes the Project Area and additional area bounded by a perimeter approximately 2 miles from the furthest extent of wind turbine generator (a.k.a., “turbine”) layout positions as contemplated in the alternatives under consideration.

Representative Receivers

This analysis considers predicted noise at five representative locations as discussed in the NVS: LT1, LT2, LT3, LMNRA, and LAKE018. The first three are long-term ambient sound measurement locations from the field survey conducted in October 2009 and as described in Section 3.15.1.3 of this EIS. LMNRA is location positioned on the border of Lake Mead NRA that adjoins the northwestern boundary of the Project for Alternative A. LAKE018 is a measurement location selected by NPS as part of its spring 2011 ambient sound level survey on Lake Mead NRA land that is in proximity to, but not co-located with, the previously described Lake Mead NRA representative location (see Map 3-10).

In addition to consideration of these five locations, which are intended to represent different broad geographical areas adjacent to the Project, this assessment also illustrates or describes other locations or areas where Project noise emission may exceed an impact indicator. This description may either be expressed as a generalized distance from one or more Project noise sources to a potential listener location where excess noise is predicted to occur; or, it may be presented graphically as an isopleth associated with an impact indicator value superimposed upon a geographical map of the Project and its surroundings that comprise the analysis study area.

Construction

Noise effects were estimated using Cadna/A®, a Windows® based software program that predicts and assesses noise levels near user-input noise sources based on internationally accepted standards (ISO 1982 [and updates], 1987a, b [and updates], 1996) for noise propagation calculations. The Cadna/A-based outdoor sound propagation model was applied to four turbine construction activity center-point locations (roughly collocated with a turbine mast) that are nearest to the five representative noise-sensitive receivers considered in this impact analysis for each of the four action alternatives.

On-road vehicular traffic from construction activity would be considered minimal enough to have little effect on the noise environment. Construction staging areas are far enough from noise receptors that construction-related noise in these areas would be expected to diminish to non-impactful levels at the receptor locations. Therefore, on-road vehicular noise and construction activities in the laydown/staging areas were not included in the Cadna/A models, which instead focus on the activity of heavy construction equipment (e.g., crane and truck) at a turbine location. Although heavy construction equipment activity would generally occur only during daylight hours, some operations such as turbine assembly and concrete pouring could occur at night; hence, estimated nighttime construction noise emission is conservatively assumed to be 4 dBA less than daytime noise emission, as detailed in the NVS.

For all alternatives, it should be noted that construction activities at any given turbine site are expected to be characterized as sporadic, with equipment-intensive events separated by relatively long periods of inactivity. For example, once a foundation is poured, it is likely that a minimum of four weeks will pass while the concrete cures and before anything else can take place. Hence, estimated noise levels are not anticipated to be constant over the construction period.

Noise from blasting operations, if such activity would be required, could be predicted based on an estimated noise level derived from the Federal Highway Administration (FHWA) Roadway Construction Noise Model User's Guide (U.S. Department of Transportation, FHWA 2006). It describes that the maximum noise level (L_{max}) at 50 feet (15 meters) from blasting would be 94 dBA. Depending on the expected frequency of blasting events over an 8-hour time period, which is not known at this time but potentially available as part of a detailed blasting plan to be developed for the Project, the corresponding L_{eq} at some distance could be predicted and compared with either the 45 dBA L_{eq} (8-hour) or 35 dBA L_{eq} (9-hour nighttime) impact indicator as geographically appropriate. Such predictions could assume attenuation from geometric divergence as sound propagates away from a source (i.e., the oft-heard "-6dB per doubling of distance" rule of thumb for a point source) and the additional sound attenuating effect of atmospheric absorption. Until more detailed information on the expected blasting activity is available, for purposes of predictive analysis in this EIS, it is assumed that up to 24 blast events occur over an 8-hour period, and that each blast event is one second in duration. Using these assumed parameters and the FHWA L_{max} data for a single event, an 8-hour L_{eq} for blasting is 45 dBA at a distance of 400 feet, absent the contribution of background sound at this location. At approximately triple this distance (1,150 feet), 35 dBA L_{eq} (8-hour) would be expected.

Using these analysis techniques and their assumptions, a noise impact would be expected to occur when the noise from heavy construction equipment operation or blasting for the Project exceeds the guidance-based thresholds of 45 dBA Leq (8-hour) on private lands in the study area and 35 dBA Leq (9-hour) nighttime level over Lake Mead NRA land.

Operational Noise

The Cadna/A® Noise Prediction Model (Version 4.0.135) was used to estimate the Project-generated operation sound level at noise-sensitive receivers (see Section 3.3.1 of the NVS for the detailed methodology). The Cadna/A outdoor sound propagation model was run for the two most prevalent wind directions (i.e., from the north and from the south) for Alternatives A, B, and C.

While the quantity of turbines varies slightly among the action alternatives (i.e., Alternatives B, C, and E represent reductions in turbine quantity from Alternative A), the turbine type used in each analysis was a Siemens SWT-2.3-113 model that can generate 2.3 MW of electrical power under a wind speed at hub height of 12 meters per second (mps). Per IEC 61400-11 (ed. 2, 2002) measurement standards, each turbine operating at this hub height wind speed (or as referenced to a wind speed of about 9 mps at 10 m above ground) or greater has a sound power level (PWL) of 105 dBA. For purposes of prediction model conservatism, an uncertainty adjustment of 2 dBA was added to this overall A-weighted PWL.

While a pad-mounted electrical transformer at the base of each turbine would create noise from ground level, its sound power would likely be much less than that of the sum of aerodynamic noise sources associated with the moving wind turbine rotor blades.

Anticipated noise from regular Project maintenance would include infrequent vehicle travel on Project Area roads that interconnect the wind turbine locations. Some human activity also would be expected at the O&M building and other Project structures or equipment areas, such as substations and the switchyard. Compared to the aggregate of Project wind turbines, these are not considered dominant or continuous sources of significant Project noise.

Using this analysis technique and its assumptions, a noise impact would be expected to occur when the Project operation noise exceeds the guidance-based threshold of 45 dBA L_{eq} (8-hour) on private lands in the study area and a 35 dBA L_{eq} (9-hour) nighttime level over Lake Mead NRA land. These thresholds are with respect to only Project operation noise and do not include non-Project sources of noise that also contribute to what would be a future ambient sound environment. When ground-level wind speeds are calm (and thus, generally do not provide a significant source of noise due to turbulence resulting from wind traversing vegetative ground cover, terrain features, or man-made structures) and in the absence of other significant non-Project noise emitters, the background sound environment could be low enough to make the Project operation noise a dominant contributor to the future ambient sound level at a receiver location. However, as indicated in Section 3.15, the existing ambient sound environment has been measured and exhibits ground-level SPL that can rise in magnitude as wind speeds at hub height elevation increase. Under the right conditions, it is possible and probable that non-Project sources of noise (e.g., turbulence resulting from wind traversing vegetative ground cover) may demonstrate overall A-weighted L_{eq} that would exceed Project operation noise at many locations.

Impact Duration

Consistent with what is described in Section 4.1.1, the duration of an impact might be considered temporary, relative to the operational life of the Project, if it is no greater than that of the construction period needed to complete the Project. Hence, construction impacts are generally considered temporary in nature, while impacts associated with operating turbines would tend to be considered long term (i.e., greater than five years after completion of Project construction), lasting for the expected operational life of the Project.

4.15.2 Alternative A – Proposed Action

4.15.2.1 Construction Noise

As shown in Table 4-29, of the five representative noise-sensitive receivers, LT2 would be expected to experience estimated Project construction sound that would exceed 45 dBA L_{eq} by more than 2 dBA during the day, and would thus be expected to experience a temporary noise impact. For receiver locations on other private lands that are similarly as distant from heavy equipment construction activity as position LT2 is (approximately 2,000 feet) from the nearest turbine, similar temporary noise impact would be expected.

Table 4-29 Estimated Heavy Equipment Construction Noise Levels at Representative Noise Sensitive Receivers

Sound Level Assessment Locations	Estimated Heavy Equipment Construction Noise (L_{eq}, dBA)			
	Alternative A		Alternatives B & C	
	Daytime (7 AM-10 PM)	Nighttime (10 PM-7 AM)	Daytime (7 AM-10 PM)	Nighttime (10 PM-7 AM)
LT1	37	33	29	25
	40 dBA L_{dn}		32 dBA L_{dn}	
LT2	47	43	47	43
	51 dBA L_{dn}		51 dBA L_{dn}	
LT3	24	20	18	14
	27 dBA L_{dn}		22 dBA L_{dn}	
LMNRA [1]	43	39	18	14
	46 dBA L_{dn}		22 dBA L_{dn}	
LAKE018 [2]	39	35	18	14
	42 dBA L_{dn}		21 dBA L_{dn}	

NOTES:
[1] Lake Mead NRA boundary location.
[2] An ambient sound survey location (N 35° 56' 30.0" W114° 26' 47.9") chosen and conducted by Lake Mead NRA via Natural Sounds Program staff of the National Park Service.

Aside from LT3, which is expected to experience construction noise ranging from only 20 to 24 dBA L_{eq}, anticipated construction noise at other representative locations would range from 33 to 47 dBA L_{eq}. At both representative Lake Mead NRA locations (LMNRA and LAKE018), and other Lake Mead NRA land that is similarly as distant from heavy equipment construction activity as these two positions are from the nearest turbine, similar temporary noise impact would be expected. Building the Project in construction intervals would have similar effects as described if the Project were built in a single interval, but the duration of construction activities could increase. The increase in the duration of construction activities would not increase the expected noise levels as the type of equipment used during construction would not change, nor would the areas where construction activities are located.

If blasting were required for the turbine foundation nearest to LT2 (a distance of approximately 2,000 feet from the noise monitoring location on the boundaries of planned residential development areas near the Wind Farm Site), the predicted blast noise level—based on the method described in Section 4.15.1.1—would be 30 dBA L_{eq} and thus considerably lower than the guidance level of 45 dBA L_{eq}. Using this prediction technique and set of assumptions, a potential receiver on private lands would have to be closer than 400 feet (122 meters) from the blast location to experience the guidance-based impact indicator of 45 dBA L_{eq} (8-hour). On Lake Mead NRA land within the study area, a potential receiver would need to be less than 1,150 feet (351 meters) distant from the blast noise source to experience the guidance-based indicator of 35 dBA L_{eq} (9-hour).

4.15.2.2 Operational Noise

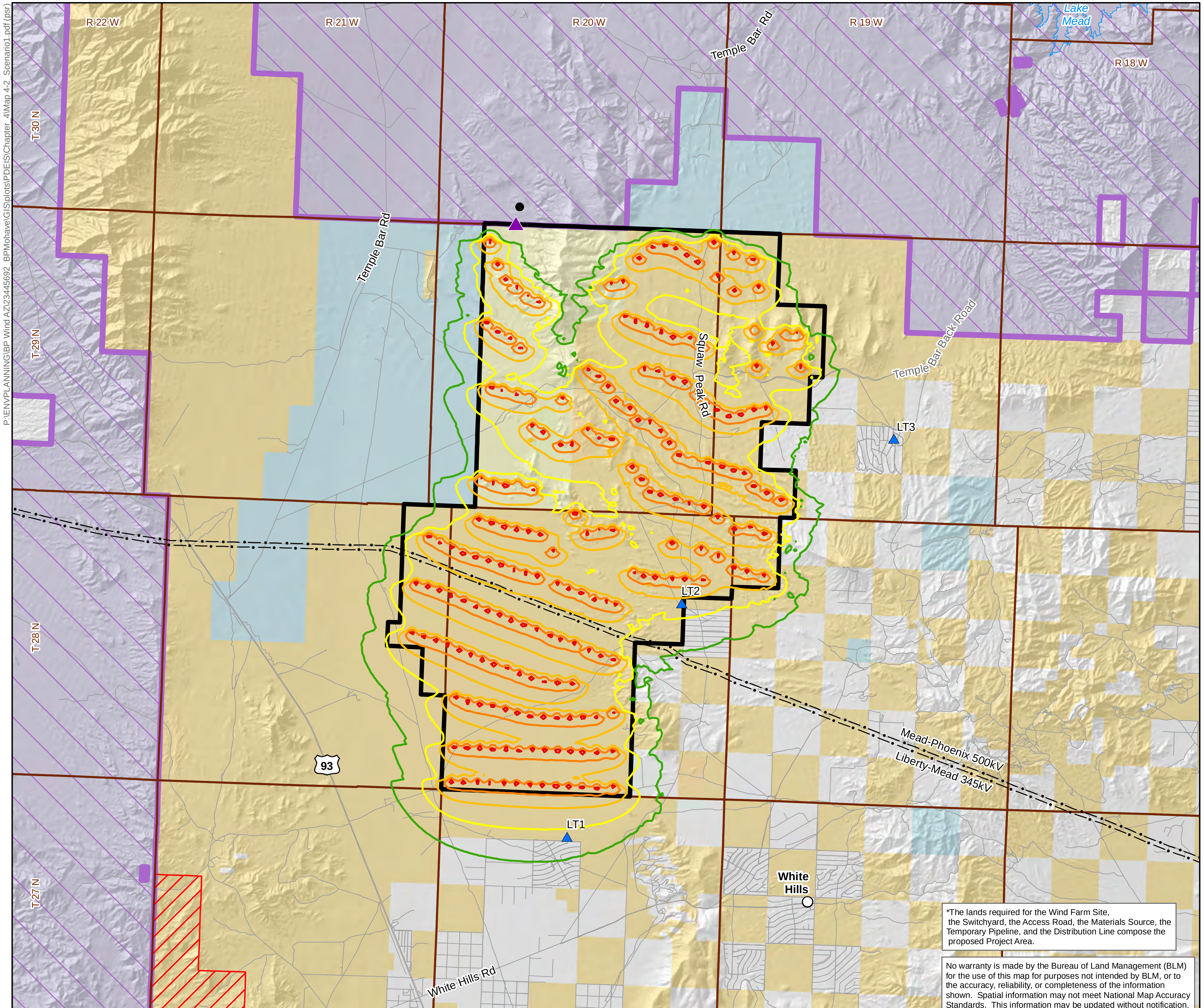
The estimated operation noise levels for the two wind-direction scenarios are shown in Table 4-30 and are less than 45 dBA L_{eq} at the three representative locations: LT1, LT2, and LT3. With the exception of the Lake Mead NRA location for the south-to-north wind scenario for Alternative A, sound levels for the two representative Lake Mead NRA locations are expected to be less than 35 dBA L_{eq}. Maps 4-2 and 4-3 help illustrate, by way of SPL isopleths, where planned or actual residential-use land might be exposed to Project operational noise levels greater than 45 dBA L_{eq}, and where Lake Mead NRA land might be exposed to Project operational noise levels greater than 35 dBA L_{eq}. In summary, the locations where these excesses occur are as follows:

- On Map 4-2, which depicts predicted turbine operation noise contours for wind headed south at 12 mps, the northwest corner of the privately owned square-mile section in Township 29 North, Range 19 West that is due west of the privately owned square-mile section occupied by LT3 is expected to experience noise levels greater than 45 dBA L_{eq} but less than 50 dBA L_{eq}.
- On Map 4-3, which depicts predicted turbine operation noise contours for wind headed north at 12 mps, the southwest corner of the privately owned square-mile section in Township 29 North, Range 19 West that is due west of the privately owned square-mile section occupied by LT3 is expected to experience noise levels greater than 45 dBA L_{eq} but less than 50 dBA L_{eq}. At two areas along the southern border of Township 30 North, Range 20 West, where Lake Mead NRA land abuts the Project Area, predicted turbine operation noise is expected to range from about 35 to 40 dBA $L_{eq,}$ which is over the 35 dBA Leq guidance-based standard proposed by Lake Mead NRA. This intrusion of Project operation noise having an anticipated SPL greater than 35 dBA L_{eq} extends into Lake Mead NRA no further than a half-mile from the northern Project boundary associated with Alternative A, and the approximate total area exposed to this Project operation noise SPL is less than one square mile.

Table 4-30 Estimated Operational Noise Levels — Cadna/A Prediction Model Scenarios

Sound Level Assessment Locations	Estimated Aggregate Project Turbine Operation (dBA L_{eq})					
	Alternative A		Alternative B		Alternative C	
	Scenario 1 (12 mps from North)	**Scenario 2** (12 mps from South)	**Scenario 1** (12 mps from North)	**Scenario 2** (12 mps from South)	**Scenario 1** (12 mps from North)	**Scenario 2** (12 mps from South)
LT1	38	27	33	22	33	22
	44 dBA L_{dn}	33 dBA L_{dn}	39 dBA L_{dn}	28 dBA L_{dn}	39 dBA L_{dn}	28 dBA L_{dn}
LT2	44	35	43	34	43	34
	50 dBA L_{dn}	41 dBA L_{dn}	49 dBA L_{dn}	40 dBA L_{dn}	49 dBA L_{dn}	40 dBA L_{dn}
LT3	26	25	23	23	23	23
	32 dBA L_{dn}	31 dBA L_{dn}	29 dBA L_{dn}	29 dBA L_{dn}	29 dBA L_{dn}	29 dBA L_{dn}
LMNRA [1]	27	38	15	25	16	25
	33 dBA L_{dn}	44 dBA L_{dn}	21 dBA L_{dn}	31 dBA L_{dn}	22 dBA L_{dn}	31 dBA L_{dn}
LAKE018 [2]	22	34	14	24	15	24
	28 dBA L_{dn}	40 dBA L_{dn}	20 dBA L_{dn}	30 dBA L_{dn}	21 dBA L_{dn}	30 dBA L_{dn}

NOTES:
[1] Lake Mead NRA boundary location.
[2] An ambient sound survey location (N 35° 56' 30.0" W114° 26' 47.9") chosen and conducted by Lake Mead NRA via Natural Sounds Program staff of the National Park Service.



Map 4-2
Alternative A
Scenario 1 Noise Contours
Wind Speed 12 m/s from North

Mohave County Wind Farm Project

Legend

Wind Farm Site*

National Park Service
Lake Mead National Recreational Area Boundary

Bureau of Land Management
Area of Critical Environmental Concern

Noise Study Locations

NPS Sound Level Measurement Location (LAKE018)

Representative LMNRA Boundary Noise Assessment Location

URS Sound Level Measurement Location

Operating WTG Noise Contours, Leq

35 dBA

40 dBA

45 dBA

50 dBA

55 dBA

Surface Management

Bureau of Land Management

Bureau of Reclamation

National Park Service

State Trust Land

Private Land

General Features

Community

Road

Exisiting Transmission Line

Township and Range Boundary

Lake

Source:
Project Site Boundary: URS 2011
Measurement and LMNRA Locations, dBA Contours: URS 2009 - 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009

NATIONAL SYSTEM OF PUBLIC LANDS

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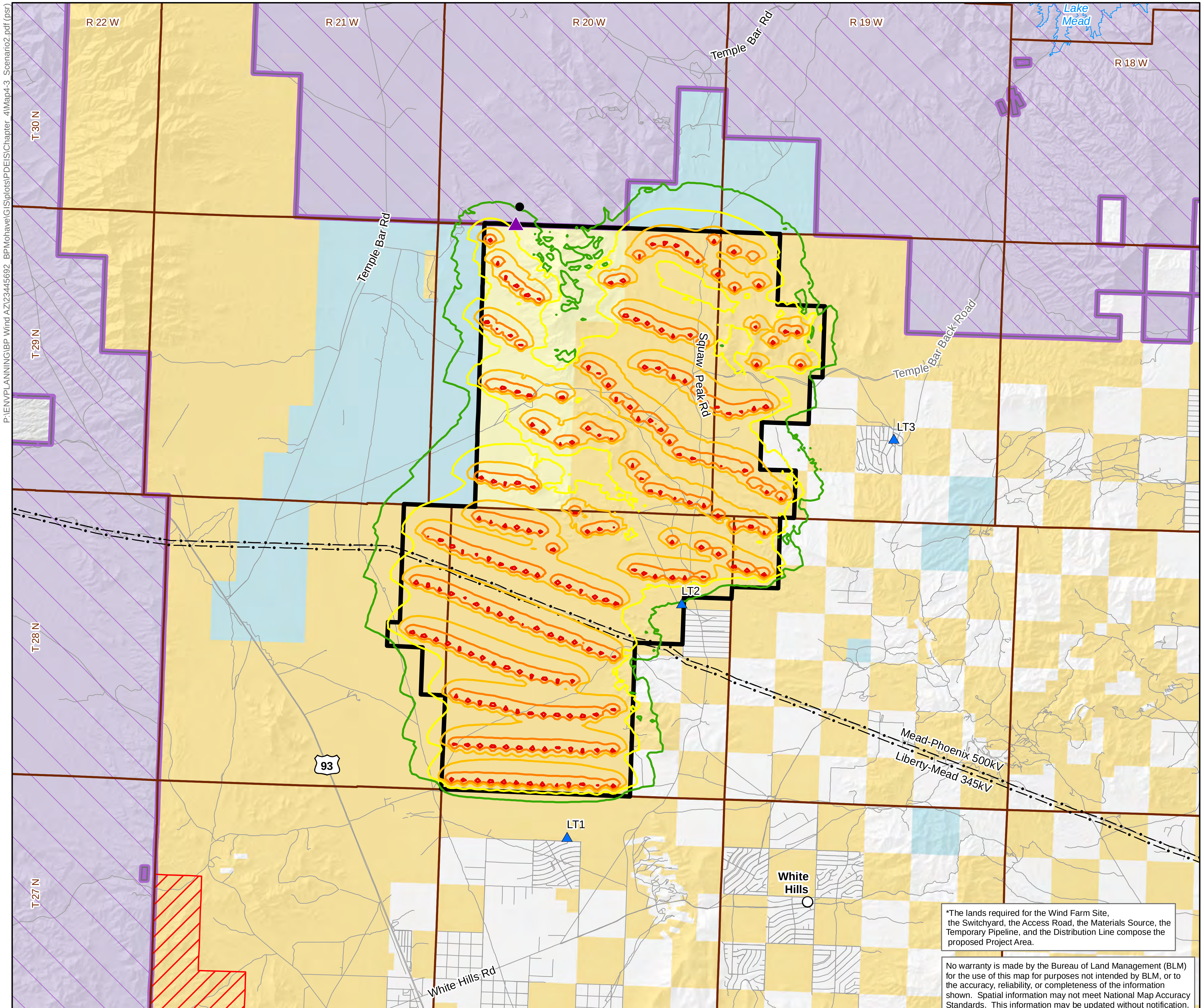
Map 4-3
Alternative A
Scenario 2 Noise Contours
Wind Speed 12 m/s from South

Mohave County Wind Farm Project



*The lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

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Legend

- Wind Farm Site*
- National Park Service Lake Mead National Recreational Area Boundary
- Bureau of Land Management Area of Critical Environmental Concern

Noise Study Locations

- NPS Sound Level Measurement Location (LAKE018)
- Representative LMNRA Boundary Noise Assessment Location
- URS Sound Level Measurement Location

Operating WTG Noise Contours, Leq

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA

Surface Management

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- State Trust Land
- Private Land

General Features

- Community
- Road
- Existing Transmission Line
- Township and Range Boundary
- Lake

Source:
Project Site Boundary: URS 2011
Measurement and LMNRA Locations, dBA Contours: URS 2009- 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009

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4.15.2.3 Decommissioning Noise

The decommissioning process is much like the construction process, but in reverse order. That is, heavy equipment would be used to remove the turbines and other related Project facilities. The noise effects would be temporary, lasting only as long as necessary to remove Project features and to reclaim the site, and would be comparable to those noise levels predicted for construction for all four action alternatives.

4.15.3 Alternative B

4.15.3.1 Construction Noise

Similar to Alternative A, of the five representative noise-sensitive receivers, only LT2 would be expected to experience estimated Project construction sound that would exceed 45 dBA L_{eq} by more than 2 dBA during the day and would thus be expected to experience a temporary noise impact. For receiver locations on other private lands that are similarly as distant from heavy equipment construction activity as position LT2 is (approximately 2,600 feet) from the nearest turbine, similar temporary noise impact would be expected.

While Alternative A construction noise at the two Lake Mead NRA representative locations would be at or above 35 dBA L_{eq}, construction noise at these two locations for Alternative B is expected to be much quieter: less than 20 dBA L_{eq}.

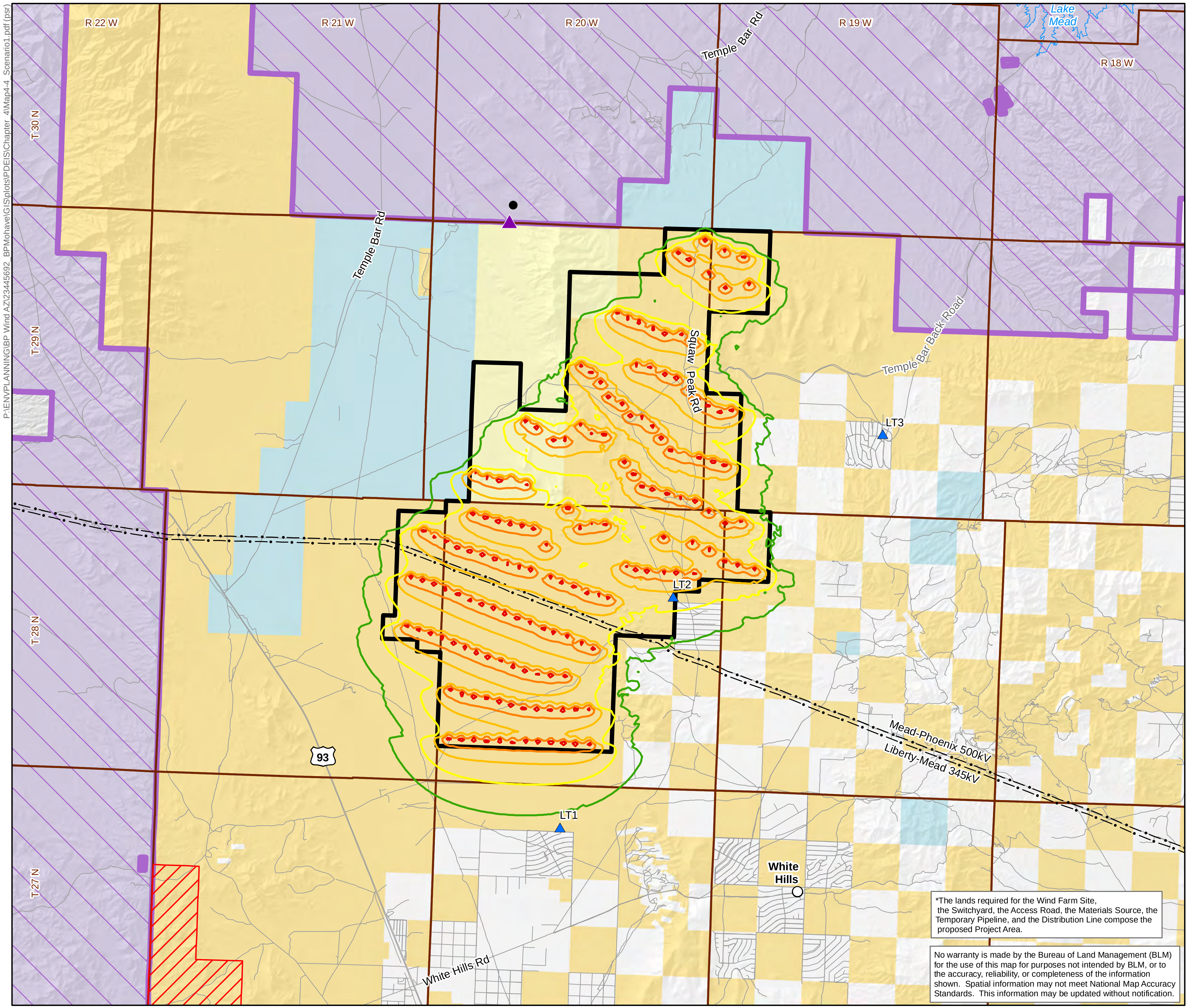
If blasting were required for the turbine foundation nearest to LT2 (a distance of approximately 2,600 feet from the noise monitoring location on the boundaries of planned residential development areas near the Wind Farm Site), the predicted blast noise level—based on the method described in Section 4.15.1.1—would be 27 dBA L_{eq} and thus considerably lower than the guidance level of 45 dBA L_{eq}. Using this prediction technique and set of assumptions, a potential receiver on private lands would have to be closer than 400 feet (122 meters) from the blast location to experience the guidance-based impact indicator of 45 dBA L_{eq} (8-hour). On Lake Mead NRA land within the study area, a potential receiver would need to be less than 1,150 feet (351 meters) distant from the blast noise source to experience the guidance-based indicator of 35 dBA L_{eq} (9-hour).

4.15.3.2 Operational Noise

The estimated operational noise levels for the two wind-direction scenarios shown in Table 4-30 are less than 45 dBA L_{eq} at each of the five representative locations. Furthermore, the sound levels are expected to be less than 35 dBA L_{eq} at the two representative Lake Mead NRA locations. Maps 4-4 and 4-5 help illustrate, by way of noise contours, that no planned or actual residential-use land is expected to be exposed to Project operational noise levels greater than 45 dBA L_{eq}, and no Lake Mead NRA land is expected to be exposed to Project operation noise levels greater than 35 dBA L_{eq}.

4.15.3.3 Decommissioning Noise

As noted in Section 4.15.2.3, decommissioning noise effects would be temporary, lasting only as long as necessary to remove Project features and to reclaim the site, and would be comparable to those noise levels predicted for construction for all four action alternatives.



Map 4-4
Alternative B
Scenario 1 Noise Contours
Wind Speed 12 m/s from North

Mohave County Wind Farm Project

Legend

- Wind Farm Site*
- National Park Service Lake Mead National Recreational Area Boundary
- Bureau of Land Management Area of Critical Environmental Concern

Noise Study Locations

- NPS Sound Level Measurement Location (LAKE018)
- Representative LMNRA Boundary Noise Assessment Location
- URS Sound Level Measurement Location

Operating WTG Noise Contours, Leq

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA

Surface Management

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- State Trust Land
- Private Land

General Features

- Community
- Road
- Exisiting Transmission Line
- Township and Range Boundary
- Lake

Source:
Project Site Boundary: URS 2011
Measurement and LMNRA Locations, dBA Contours: URS 2009 - 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009

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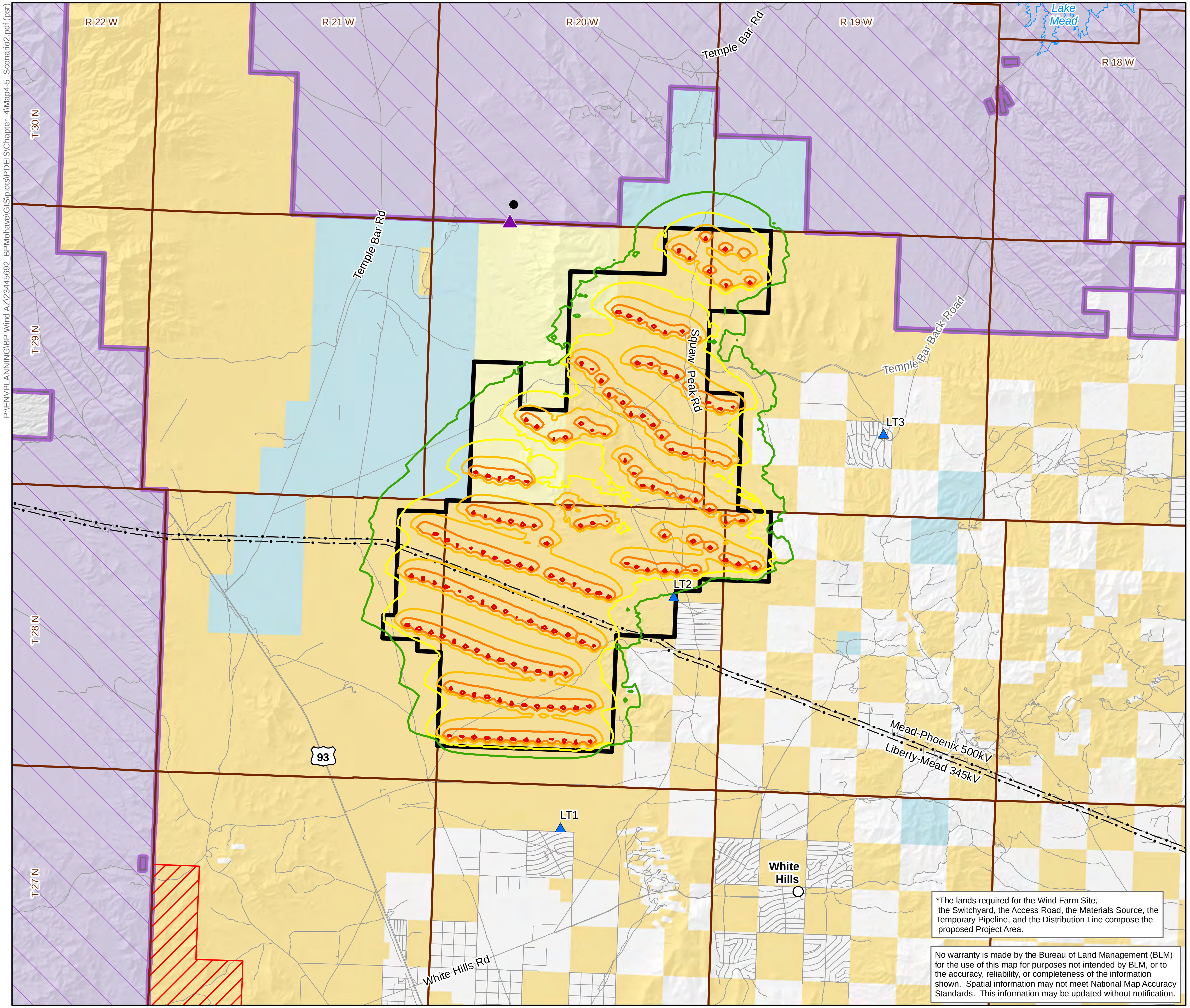
Map 4-5
Alternative B
Scenario 2 Noise Contours
Wind Speed 12 m/s from South

Mohave County Wind Farm Project



Legend

- Wind Farm Site*
- National Park Service Lake Mead National Recreational Area Boundary
- Bureau of Land Management Area of Critical Environmental Concern

Noise Study Locations

- NPS Sound Level Measurement Location (LAKE018)
- Representative LMNRA Boundary Noise Assessment Location
- URS Sound Level Measurement Location

Operating WTG Noise Contours, Leq

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA

Surface Management

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- State Trust Land
- Private Land

General Features

- Community
- Road
- Existing Transmission Line
- Township and Range Boundary
- Lake

Source:
Project Site Boundary: URS 2011
Measurement and LMNRA Locations, dBA Contours: URS 2009- 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009

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4.15.4 Alternative C

4.15.4.1 Construction Noise

Similar to Alternative A, of the five representative noise-sensitive receivers, only LT2 would be expected to experience estimated Project construction sound that would exceed 45 dBA L_{eq} by more than 2 dBA during the day and would thus be expected to experience a temporary noise impact. For receiver locations on other private lands that are similarly as distant from heavy equipment construction activity as position LT2 is from the nearest turbine (approximately 2,600 feet), similar temporary noise impacts would be expected.

While Alternative A construction noise at the two Lake Mead NRA representative locations would be at or above 35 dBA L_{eq}, construction noise at these two locations for Alternative C is expected to be much quieter: less than 20 dBA L_{eq}.

If blasting were required for the turbine foundation nearest to LT2 (a distance of approximately 3,100 feet from the noise monitoring location on the boundaries of planned residential development areas near the Wind Farm Site), the predicted blast noise level—based on the method described in Section 4.15.1.1—would be 25 dBA L_{eq} and thus considerably lower than the guidance level of 45 dBA L_{eq}. Using this prediction technique and set of assumptions, a potential receiver on private lands would have to be closer than 400 feet (122 meters) from the blast location to experience the guidance-based impact indicator of 45 dBA L_{eq} (8-hour). On Lake Mead NRA land within the study area, a potential receiver would need to be less than 1,150 feet (351 meters) distant from the blast noise source to experience the guidance-based indicator of 35 dBA L_{eq} (9-hour).

4.15.4.2 Operational Noise

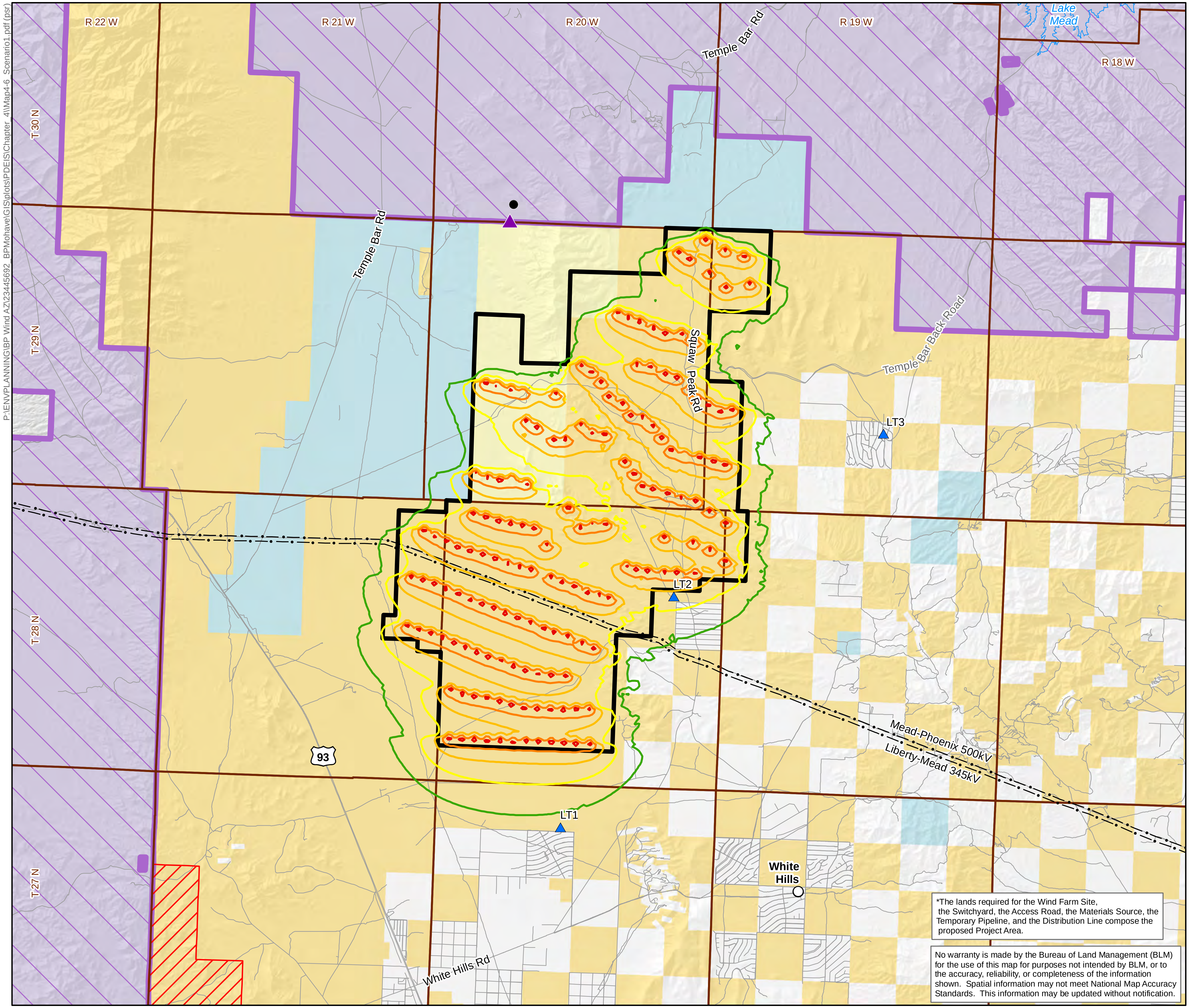
The estimated operational noise levels for the two wind-direction scenarios shown in Table 4-30 are less than 45 dBA L_{eq} at each of the five representative locations, and less than 35 dBA L_{eq} at the two representative Lake Mead NRA locations. Maps 4-6 and 4-7 help illustrate, by way of noise contours, that no planned or actual residential-use land is expected to be exposed to Project operational noise levels greater than 45 dBA L_{eq}, and no Lake Mead NRA land is expected to be exposed to Project operation noise levels greater than 35 dBA L_{eq}.

4.15.4.3 Decommissioning Noise

As noted in Section 4.15.2.3, decommissioning noise effects would be temporary, lasting only as long as necessary to remove Project features and to reclaim the site, and would be comparable to those noise levels predicted for construction for all four action alternatives.

Map 4-6
Alternative C
Scenario 1 Noise Contours
Wind Speed 12 m/s from North

Mohave County Wind Farm Project



Legend

- Wind Farm Site*
- National Park Service Lake Mead National Recreational Area Boundary
- Bureau of Land Management Area of Critical Environmental Concern

Noise Study Locations

- NPS Sound Level Measurement Location (LAKE018)
- Representative LMNRA Boundary Noise Assessment Location
- URS Sound Level Measurement Location

Operating WTG Noise Contours, Leq

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA

Surface Management

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- State Trust Land
- Private Land

General Features

- Community
- Road
- Exisiting Transmission Line(s)
- Township and Range Boundary
- Lake

Source:
Project Site Boundary: URS 2011
Measurement and LMNRA Locations, dBA Contours: URS 2009 - 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009

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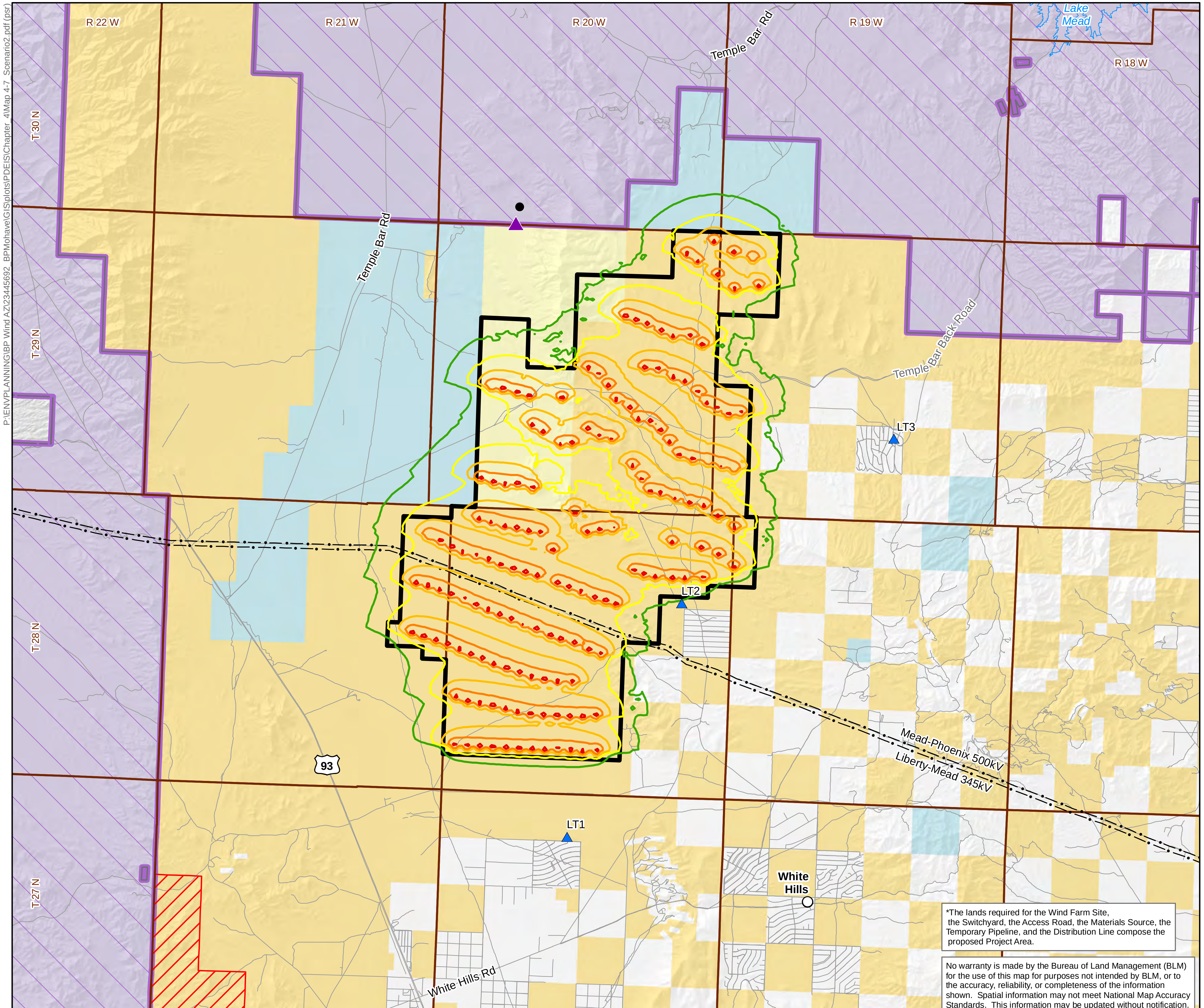

Map 4-7
Alternative C
Scenario 2 Noise Contours
Wind Speed 12 m/s from South

Mohave County Wind Farm Project

Legend

Wind Farm Site*

National Park Service
Lake Mead National Recreational Area Boundary

Bureau of Land Management
Area of Critical Environmental Concern

Noise Study Locations

NPS Sound Level Measurement Location (LAKE018)

Representative LMNRA Boundary Noise
Assessment Location

URS Sound Level Measurement Location

Operating WTG Noise Contours, Leq

35 dBA

40 dBA

45 dBA

50 dBA

55 dBA

Surface Management

Bureau of Land Management

Bureau of Reclamation

National Park Service

State Trust Land

Private Land

General Features

Community

Road

Existing Transmission Line

Township and
Range Boundary

Lake

Source:
Project Site Boundary: URS 2011
Measurement and LMNRA Locations, dBA Contours: URS 2009- 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 1997-2008, BLM 2009

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4.15.5 Alternative D – No Action

The No Action Alternative involves no construction, operations or maintenance, or decommissioning of the Project; thus, no noise impacts are anticipated. Existing background noise levels in the Project Area and vicinity would pervade and comprise noise from general recreational uses, occasional aircraft (including fixed-wing commercial flights and helicopter tourism), traffic on area roads and highways, and other noise already present in the Project Area. If residential land use construction activity increases, such activity and its resulting development of residences (and their corresponding noise-producing activities) may correspondingly increase the ambient sound environment.

4.15.6 Alternative E – Agencies' Preferred Alternative

4.15.6.1 Construction Noise

Noise effects on Lake Mead NRA would be comparable to those described for Alternative B except that the turbines that could be constructed in Township 29 North, Range 20 West, Section 2 would be expected to result in occasional Project operational noise levels of 35 dBA when wind speeds from the south are at or exceed 12 m/s (about 27 mph). At these wind speeds, generally much of the turbine noise would be masked by the sound of the wind and rustling vegetation; the effects on Lake Mead NRA lands would be limited to about 300 acres or less. Noise effects on private property would be similar to Alternative A as described in Section 4.15.2 if the southern string were built to meet the required nameplate capacity, but similar to Alternative B as described in Section 4.15.3 if construction of the southern string was not required.

4.15.6.2 Operational Noise

Noise effects on Lake Mead NRA would generally be comparable to those described for Alternative B except that the turbines that could be constructed in Township 29 North, Range 20 West, Section 2 would be expected to result in occasional Project operational noise levels that exceed 35 dBA L_{eq}, depending on turbine layout per the following descriptions.

For installation of 77-82.5 meter rotor diameter turbines, as depicted in Map 2-11, noise levels of approximately 35 dBA to 45 dBA L_{eq} over Section 34 would be expected when wind speeds from the south are at or exceed 12 m/s (about 27 mph). At these turbine hub height wind speeds, the predicted aggregate turbine noise would be expected to be less than or comparable to the anticipated 42 dBA L_{eq} sound level (see Table 4-30) of the wind and rustling vegetation at ground-level receiver locations in this affected portion of Lake Mead NRA. The affected area of Lake Mead NRA lands (i.e., where Project operation noise would be greater than 35 dBA L_{eq}) would be limited to about 300 acres or less.

For installation of 90-101 meter rotor diameter turbines, as depicted in Map 2-12, noise levels of approximately 35 dBA to 40 dBA L_{eq} over a portion of Section 34 of Township 30 North, Range 20 West would be expected when wind speeds from the south are at or exceed 12 m/s (about 27 mph). At these turbine hub height wind speeds, the predicted aggregate turbine noise would be expected to be less than the anticipated 42 dBA L_{eq} sound level (see Table 4-30 of the wind and rustling vegetation at ground-level receiver locations in this affected portion of Lake Mead NRA. The affected area of Lake Mead NRA lands (i.e., where Project operation noise would be greater than 35 dBA L_{eq}) would be limited to about 150 acres or less.

For installation of 112-118 meter rotor diameter turbines, as depicted in Map 2-13, noise levels of approximately 35 dBA to 40 dBA L_{eq} over a portion of Section 34 of Township 30 North, Range 20 West would be expected when wind speeds from the south are at or exceed 12 m/s (about 27 mph). At these turbine hub height wind speeds, the predicted aggregate turbine noise would be expected to be less than the anticipated 42 dBA L_{eq} sound level (see Table 4-30) of the wind and rustling vegetation at ground-level receiver locations in this affected portion of Lake Mead NRA. The affected area of Lake Mead NRA lands (i.e., where Project operation noise would be greater than 35 dBA L_{eq}) would be limited to about 90 acres or less.

Noise effects on private property would generally be similar to Alternative A as described in Section 4.15.2 if the southern string were built to meet the required nameplate capacity. If construction of the southern string was not required, the potentially affected area to the south of the Project would more resemble that of Alternative B. Depending on if either the 77-82.5 or the 90-101 meter roter diameter turbine size and layouts as depicted in Maps 2-11 and 2-12, other exceptions to similarity from Alternative A predicted operation noise effects are described as follows:[4]

- For installation of 77-82.5 meter rotor diameter turbines as depicted in Map 2-11, portions of Section 29 of Township 29 North, Range 19 West that adjoin the Wind Farm Site boundary would be expected to experience Project operation noise in excess of 45 dBA L_{eq} when wind speeds from the north or south are at or exceed 12 m/s (about 27 mph). At these turbine hub height wind speeds, this predicted aggregate turbine noise would be expected to be comparable to the anticipated 42 dBA L_{eq} sound level (see Table 4-24 from the DEIS) from the wind and rustling vegetation at ground-level receiver locations; and the affected area would be limited to about 100 acres or less.
- For installation of 77-82.5 meter and 90-101 meter rotor diameter turbines as depicted in Maps 2-11 and 2-12, portions of Section 13 of Township 28 North, Range 20 West that adjoin the Wind Farm Site boundary would be expected to experience Project operation noise slightly in excess of 45 dBA L_{eq} when wind speeds from the north or south are at or exceed 12 m/s (about 27 mph). At these turbine hub height wind speeds, this predicted aggregate turbine noise would be expected to be comparable to the anticipated 42 dBA L_{eq} sound level (see Table 4-24 from the DEIS) from the wind and rustling vegetation at ground-level receiver locations; and the affected area would be limited to about 50 acres or less.
- For installation of 112-118 meter roter diameter turbines as depicted in Maps 2-13, portions of Section 13 of Township 28 North, Range 20 West that adjoin the Wind Farm Site boundary would be not be expected to experience Project operation noise.

4.15.6.3 Decommissioning Noise

As noted in Section 4.15.2.3, decommissioning noise effects would be temporary, lasting only as long as necessary to remove Project features and to reclaim the site, and would be comparable to those noise levels predicted for construction for all four action alternatives.

4.15.7 Mitigation Measures

4.15.7.1 Measures Common to All Action Alternatives

The following measures are would be implemented during construction and decommissioning to reduce noise levels:

- All noise-producing equipment and vehicles using internal combustion engines would be equipped with exhaust mufflers, air-inlet silencers where appropriate, and any other shrouds,

[4] The 110-118 meter roter diameter turbines layouts as shown on Map 2-13 do not place place wind turbines at the eastern end of the turbine corridor in T .28 N, R. 20 W. Section 14.

shields, or other noise-reducing features in good operating condition that meet or exceed original factory specification. Mobile or fixed “package” equipment (e.g., arc-welders, air compressors) would be equipped with shrouds and noise control features that are readily available for that type of equipment. The diesel generator, a potential power source for the batch plant described in Chapter 2, would similarly be equipped to keep its resulting sound emission to levels below 81 dBA at a distance of 50 feet.

- All mobile or fixed noise-producing equipment used on the Project, which is regulated for noise output by a local, state, or Federal agency, would comply with such regulation while in the course of Project activity.
- The use of noise-producing signals, including horns, whistles, electronic alarms, sirens, and bells, would be for safety warning purposes only.
- No construction-related public address, loudspeaker, or amplified music system would exhibit sound levels that exceed limits imposed by local regulation at any adjacent noise-sensitive land use, or that exceed noise limits imposed on elements of the wind farm, whichever is the lowest level of acceptable noise.
- BP Wind Energy and their contractors would implement a noise complaint process and hotline number for usage by members of the surrounding community (e.g., White Hills, Arizona). Upon establishment of the hotline, BP Wind Energy or its compliance inspectors would have the responsibility and authority to receive, evaluate, coordinate with the BLM or Reclamation representatives, respectively, and when appropriate make reasonable efforts to resolve noise complaints. The resolution and evaluation of noise complaints would be subject to appropriate criteria as described in this Final EIS, and as identified as the Mohave County Noise Standards – Maximum Noise Levels for Various Land Uses (Figure 3-7).

The following measures would help the Project maintain low noise levels during operations and maintenance:

- The proposed Project design and implementation would include appropriate noise attenuation measures adequate to help ensure that the noise levels from turbine transformers, substations, and other ancillary systems or components would not cause aggregate noise levels produced by operation of the Project to exceed identified thresholds. For instance, HVAC systems on an occupied control or maintenance building might feature, if needed, sound abating cabinet linings or intake/exhaust shrouds that are typically offered by manufacturers as optional equipment upgrades.
- Maintenance and security patrol vehicles, such as pick-up trucks and/or all-terrain vehicles, using internal combustion engines would be equipped with exhaust mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specification. Operation of these vehicles would typically be expected to occur on access roads that interconnect turbine positions.

In addition to these general measures, the following mitigation measures are suggested as appropriate and with respect to a 45 dBA L_{eq} guidance-based goal for planned or actual residential land, and a quieter 35 dBA L_{eq} guidance-based goal for Lake Mead NRA land.

4.15.7.2 Alternative A

The options for mitigating wind turbine operational noise to meet the 45 dBA Leq guidance-based goal for planned or actual residential land and to meet the quieter 35 dBA Leq guidance-based goal for Lake Mead NRA land tend to be limited. One method would be to increase distance between impacted receiver positions and the nearest wind turbines that are likely to be the most significant contributors to the aggregate wind turbine operation noise level. Action Alternatives B and C effectively provide this form of mitigation by way of their reduced wind turbine quantity and siting layouts being different from that of Alternative A.

4.15.7.3 Alternative B

No operation noise impacts are anticipated, thus no mitigation is foreseen for this action alternative.

4.15.7.4 Alternative C

No operation noise impacts are anticipated, thus no mitigation is foreseen for this action alternative.

4.15.8 Unavoidable Adverse Impacts

The turbine layout associated with Alternative A appears to expose some nearby planned or existing residential land uses to operation noise levels that exceed the guidance criterion of 45 dBA L_{eq}, and expose some Lake Mead NRA land to operation noise levels that exceed the guidance-based criterion of 35 dBA L_{eq}. Since all turbines in the layout for Alternative A are expected to operate at full capacity under the right ambient wind conditions, this potential impact appears unavoidable without intentionally "turning off" a quantity of turbines, which is what Alternatives B and C essentially represent.

4.16 CUMULATIVE IMPACTS

The Council on Environmental Quality (CEQ) regulations for implementing NEPA requires the consideration of cumulative effects in the decision-making process for federal projects. Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Cumulative impacts are most likely to occur when a relationship exists between a proposed alternative and other actions that have, or are expected to occur in a similar location, time period, or involve similar actions. A geographic scope for the analysis of each resource has been defined and is presented in Table 4-31, Cumulative Impact Analysis Areas. Geographic scope is usually defined by the natural boundaries of the resources, rather than Project Area administrative boundaries. These areas were defined to be inclusive of all potentially significant effects on the resources of concern and effects from the combined impacts of the Project and other past, present, and reasonably foreseeable future actions. Projects in close proximity to the proposed alternatives would be expected to have more potential for cumulative impacts than those more geographically separated. Similarly, cumulative impacts could occur from individually insignificant actions, but may become significant when combined with other actions taking place over a period of time. As defined previously, temporary impacts are those that would occur primarily during construction, short-term impacts would persist for up to about 5 years, and long-term effects would occur for an extended period, longer than 5 years (Section 4.1.1). The timeframe for the analysis of each resource also has been defined and is presented in Table 4-31.

Table 4-31 Cumulative Impact Analysis Areas

Resource	Cumulative Impact Analysis Area	Cumulative Impact Analysis Timeframe	Rationale for Cumulative Impact Analysis Area and Timeframe	Elements to Consider
Climate and Air Quality	Project boundary plus a 10-mile buffer Project boundary for greenhouse gas emissions is undefined	Temporary (Long term for greenhouse gas emissions)	Particulates and fugitive dust are not expected to travel farther than10 miles before settling to the ground. Particulates and fugitive dust would be generated primarily during construction and decommissioning.	• Particulates (PM_{10} and $PM_{2.5}$) • Hazardous Air Pollutants • Fugitive dust
Geology, Soils, and Minerals	Lower and Middle Detrital watershed and the Trail Rapids Wash-Lower Colorado River watershed	Long term to permanent	Erosion from wind and water movement in disturbed areas is expected to be minimal beyond the watersheds. Impacts on soils, geologic resources, and minerals would occur primarily during construction, with potential to extend over the life of the wind farm and beyond.	**Soils:** • Erosion from wind and/or water • Soil productivity • Soil stability **Geology and Minerals:** • Access to mineral resources • Regional or local use of mineral materials
Water Resources	Lower and Middle Detrital watershed and the Trail Rapids Wash-Lower Colorado River watershed	Temporary to short term	Erosion from wind and water movement in disturbed areas is expected to be minimal beyond the watersheds. Impacts on water resources would be generated primarily during construction and decommissioning.	• Sediment erosion into drainages • Hydrological function • Groundwater use
Biological Resources	**Vegetation:** Project Area plus a 20-mile buffer that is limited by the boundary of the Colorado River on the north and west. **Noxious Weeds:** Project Area plus a 20-mile buffer that is limited by the boundary of the Colorado River on the north and west. **Special Status Plants:** Project Area plus a 20-mile buffer that is limited by the boundary of the	Short and long term	Provides a naturally divisible analysis to account for regional ecological processes within the area, while disregarding negligible effects beyond the natural boundary of the Colorado River for species other than the golden eagle. The golden eagle analysis accounts for current BLM directive to analyze potential impacts on	**Vegetation:** • Conversion of native landcover • Change in plant composition **Noxious Weeds and Invasive Species:** • Introduction and spread of noxious weeds and invasive species **Wildland Fire:** • Change in fire frequency • Change in fire regime

Resource	Cumulative Impact Analysis Area	Cumulative Impact Analysis Timeframe	Rationale for Cumulative Impact Analysis Area and Timeframe	Elements to Consider
	Colorado River on the north and west. **Terrestrial Wildlife:** Project Area plus a 20-mile buffer that is limited by the boundary of the Colorado River on the north and west. **Golden Eagle:** Project Area plus a 90-mile buffer **Bats and Other Birds:** Project Area plus a 20-mile buffer that is limited by the boundary of the Colorado River on the north and west.		golden eagles as these relate to the regional breeding population and the usual dispersal distance for golden eagle fledglings. Impacts on biological resources would be generated during construction, operations and maintenance and decommissioning.	**Special Status Plants:** • Changes in quantity and quality of habitat • Change in population numbers **Terrestrial Wildlife:** • Change to quantity and quality of habitat • Change to food resources • Causes of fatality **Raptors:** • Change to quantity and quality of habitat • Change to food resources • Change to regional breeding population **Bats and Other Birds:** • Change to quantity and quality of habitat • Change to food resources • Change to roost site availability • Change to regional population • Causes of fatality
Wildland Fire	Hualapai and Detrital watersheds	Long term	Provides a naturally divisible analysis to account for regional ecological processes related to dispersal of seeds and non-native propagules and surface disturbances that could affect fire regime and condition class. Impacts on fire regime would be related to changes to vegetation and land uses over the life of the Project.	• Fire condition class • Fire regime

Resource	Cumulative Impact Analysis Area	Cumulative Impact Analysis Timeframe	Rationale for Cumulative Impact Analysis Area and Timeframe	Elements to Consider
Cultural Resources	Project boundary plus a 20-mile buffer	Long term to permanent	Consistent with defined area of potential effects for visual impacts on cultural resources. Impacts on cultural resources could continue over the life of the wind farm.	• Cultural resources disturbed or destroyed by prior, ongoing, and future actions • Cultural resources protected by management objectives within the analysis area. (ACECs, wilderness, LMNRA)
Paleontological Resources	Lower and Middle Detrital Wash, up to 10 miles from the Project boundary and Trail Rapids Wash-Lower Colorado River watershed boundaries, up to 10 miles from the Project boundary	Permanent	Provides consistency with analysis of soils and water resources and associated areas of erosion from wind and water movement. Disturbed areas are expected to be minimal beyond several miles from the site. Impacts on paleontological resources would occur primarily during construction, with potential to extend over the life of the wind farm and beyond.	• Geologic resources that potentially contain significant fossils
Land Use	Project boundary plus a 20-mile buffer The area also would include the extent of involved electric transmission systems.	Temporary to long term	Impacts to land use related to residential development, utility corridors, and livestock grazing would be limited to the Project Area and 20-mile buffer. Impacts beyond 20 miles are expected to be minimal. Impacts on land use could include displacement of activities during construction and changes in future use patterns over the life of the wind farm.	• Residential developments • Utility corridors and areas used to support transmission lines • Grazing allotments Big Ranch Units A and B and Gold Basin • National Park Service and State Trust lands • Existing mining claims
Recreation	Project boundary plus a 20-mile buffer	Temporary to long term	Consistency with visual and cultural resources, as most recreational impacts would be associated with past/traditional experience and visual aspects from recreational sites.	• Changes to the recreation setting and experience including: − Soundscape − Visual resources − Vegetation communities

Resource	Cumulative Impact Analysis Area	Cumulative Impact Analysis Timeframe	Rationale for Cumulative Impact Analysis Area and Timeframe	Elements to Consider
			Impacts on recreation could include displacement of activities during construction and changes in recreational use patterns over the life of the wind farm.	– Developed and primitive camping – Wildlife viewing – OHV routes and use – Horseback riding and hiking – Hunting – Fishing – Wilderness Areas – Mount Wilson and Mount Tipton – NPS-proposed wilderness
Transportation and Access	Project boundary plus a 20-mile buffer	Temporary	Impacts to the transportation network are expected to be minimal in the areas beyond the Project. Impacts on transportation and access would occur primarily during construction and decommissioning.	• Annual Average Daily Traffic (AADT) levels on Federal, State or County roads • Change in access to specific areas • Change in the type of vehicles using the transportation network
Social and Economic Conditions	Mohave County	Temporary and long term	Impacts to employment and income opportunities are expected to increase through added employment and the associated income. Quality of life factors may be impacted by the Project. Impacts on social and economic conditions could occur from construction (and decommissioning) and operations.	• Employment factors, including job opportunities, commuting distance, and salaries • Housing vacancy • Median income • Tax and other revenues paid to local, State and Federal agencies • Quality of life parameters such as recreation opportunities and environmental quality • Tax base and revenue generated to the Federal government and County/City governments

Resource	Cumulative Impact Analysis Area	Cumulative Impact Analysis Timeframe	Rationale for Cumulative Impact Analysis Area and Timeframe	Elements to Consider
Environmental Justice	Mohave County	Temporary and long term	While the Project may impact populations more locally, projects throughout the County may influence presence of environmental justice populations. Impacts on low-income and minority populations could result from construction (and decommissioning) and operations.	• Disproportionate impact on low income and minority populations
Visual Resources	Project boundary plus a 20-mile buffer	Short and long term	BLM's visual threshold for "Seldom Seen" land is 15 miles; however, the viewshed may extend beyond this distance and certain sensitive locations may view this and other projects simultaneously. Impacts on visual resources could occur during construction (and decommissioning) and operations.	• Viewer sensitivity from residents/communities, recreational users, travelers along Highway 93, Lake Mead National Recreation Area (LMNRA) visitors • Night sky impacts • Landscape characteristics including line, form, color, and texture • Contrasting elements on the landscape from the addition of structures (turbines, roads, transmission lines, substations/ switchyards) to the visual environment
Public Safety, and Hazardous Materials and Solid Waste	**Public Safety:** • Project boundary • US-93 between Hoover Dam and the intersection of Pierce Ferry Road • White Hills Road • Unpaved/unmarked access roads within 5 miles of the Project boundary	Temporary and long term	**Public Safety:** Impacts to public safety related to traffic accidents would be expected to occur on roadways located within and nearby the Project Area, as well as on roadways used to deliver parts and equipment. Occupational accidents would be limited to those incidents occurring at the Project Area.	**Public Safety:** • Potential exposure to hazardous materials and solid waste • Increased traffic • Introducing oversized loads into the traffic flow for the short term • Visibility issues related to fugitive dust • Health issues associated with fugitive dust

Resource	Cumulative Impact Analysis Area	Cumulative Impact Analysis Timeframe	Rationale for Cumulative Impact Analysis Area and Timeframe	Elements to Consider
	Hazardous Materials and Solid Waste: Project boundary plus 1 mile buffer and projects that use, store, or transport hazardous materials		**Hazardous Materials and Solid Waste:** Due to Project activities within the Project boundary, it is anticipated that spills of hazardous materials or wastes could occur. The transport, or handling of hazardous materials is regulated, and any off-site spills (from either the Project, or other hazardous waste carriers) would be disposed of as required by handling permits. Any project that uses, stores, or transports hazardous materials could create an impact due to unexpected spills or traffic accidents. Impacts on public safety and from hazardous materials could occur during construction (and decommissioning) and operations.	**Hazardous Materials and Solid Waste:** Areas used for the storage and transport of hazardous material and solid waste
Microwave Radar and Other Communications	Because no impact on microwave radar and other communications would occur as a result of the proposed Project or alternatives, no cumulative impacts are analyzed.			

Resource	Cumulative Impact Analysis Area	Cumulative Impact Analysis Timeframe	Rationale for Cumulative Impact Analysis Area and Timeframe	Elements to Consider
Noise	Project boundary plus a 5-mile buffer	Temporary and long term	Noise from a source diminishes with distance. From predictive noise models on the Project, in general, predicted operation or construction noise seems to fall below 35 dBA Leq (i.e., the lower of the two thresholds under Elements to Consider) when the distance between a potential receiver and the noise generator is over 2.5 miles. If another project (i.e., from the cumulative list) was also creating noise of similar magnitude, and was similarly 2.5 miles distant from the same receiver but in the opposite direction (and thus, 5 miles distant from the Project), the combined noise level would also likely be less than 35 dBA. Impacts from noise could occur during construction (and decommissioning) and operations.	• 35 dBA threshold for potential impact over LMNRA land • 45 dBA threshold for residential development • Other renewable projects, existing communities, residences, proposed master planned communities • Commercial over flights, traffic noise from Hwy 93 • Detrital Wash material pit use

In December 2010, a letter and map were sent to numerous agencies to request their input on actions within the defined study region for the Project Area that might contribute to a cumulative effects analysis.[5] Responses were received from the Hualapai Tribe, the AGFD and Mohave County. Many of the identified actions had no schedule associated with them, or the project was not implemented as scheduled. Table 4-32 presents a description of the past, present and reasonably foreseeable future actions and projects that were considered in the analysis of the incremental impact of the Project when added to other actions. The past, present, and reasonably foreseeable infrastructure projects that would occur within a 20-mile radius of the Project Area are displayed, to the extent practicable, on Map 4-8. The specific impacts of each action or activity in Table 4-32 are not independently analyzed or presented, but have been considered and included within the analysis of cumulative impacts on each resource.

Past, current, and reasonably foreseeable future management activities occurring in the cumulative impact areas include mining activities, livestock grazing, range improvements, recreation (hunting, OHV use), access routes, other renewable energy projects, temporary met towers, transmission lines, telephone lines, communication towers, and community development. Other disturbances that are ongoing include wildfire and establishment and spread of noxious weeds and invasive plant species. All resource impacts would be added to these actions to present the cumulative picture or incremental contribution this Project would have on the resources. Quantitative information is used when available and as appropriate to portray the magnitude of an impact; however, for most past, present and reasonably foreseeable activities, quantitative information is not available. Consequently, this assessment is primarily qualitative for most resources.

Table 4-32 Past, Present, and Reasonably Foreseeable Future Actions and Projects

Action / Project Name	Description	Location
Past Actions / Projects		
Historical Mining	Prospectors first ventured into Mohave County after the northern California gold placers played out during the 1850s and 1860s. In the early 1860s, an outcropping of lode gold was discovered about 25 miles southwest of Kingman, and the Moss Mine was developed. That mine eventually yielded $250,000 in gold and led to a Mohave County mining rush that lasted into the mid-1860s. Mining activities were briefly curtailed in the county between 1865 and 1868 because of heightened tensions with the Hualapai Tribe, but by 1870 the discovery of rich silver and gold veins in the Hualapai and Cerbat ranges, as well as increased military presence, resulted in a resurgence. Prospectors from Nevada and California flowed into the area, and the population of the mining camps of Cerbat, Todd Basin, Mineral Park, and Stockton Hill grew. By 1880, more than 2,000 mining claims were staked in those areas. Mining became a major source of income in Mohave County after the Atlantic & Pacific Railroad (later known as the Atchison Topeka & Santa Fe Railway) arrived in 1883, which reduced transportation costs and provided a means for obtaining better equipment. By 1909, prospectors had	Mohave County, Arizona

[5] BLM requested input from the following agencies/tribe: Western Area Power Administration, National Park Service (Lake Mead National Recreation Area), Natural Resources Conservation Service, U.S. Army Corps of Engineers, U.S. Department of Defense, Arizona Department of Game and Fish, Arizona Department of Environmental Quality, Arizona Department of Transportation, Arizona State Land Department, Mohave County (Development Services), and the Hualapai Tribe.

Action / Project Name	Description	Location
	established 11 mining districts in Mohave County, mostly in the Black Mountains or the Cerbat range. The Gold Road Mine, Tom Reed Mine, and United Eastern Mine in the Black Mountains are considered the three greatest gold mines in Arizona, having shipped nearly 2 million ounces of gold and more than 1 million ounces of silver between 1870 and 1980. Mining activity in the county decreased in the 1920s, but the Great Depression stimulated renewed mining activity in the 1930s. In 1942, most mines were declared nonessential to the World War II effort and mining activity in Mohave County has been limited ever since.	
Historical Grazing	Free grazing on the public domain brought ranchers west, and the arrival of miners and soldiers in Mohave County in the 1850s and 1860s stimulated the development of farms and ranches to supply their settlements. Most of the ranches in the county were small, family-operated cattle operations along the Colorado River, but some sheep, goats, horses, and pigs also were raised. Ranching expanded into the Big Sandy River Valley in the interior of Mohave County by 1865. Ten years later, ranches were being established in the Sacramento and Hualapai valleys and in the Hackberry and Peach Springs areas. The cattle industry was booming by the late 1880s, and by 1890, it was estimated that 60,000 head of cattle and 500 goats grazed Mohave County ranges. In 1883, the Atlantic & Pacific Railroad was completed, providing easier access to suppliers and markets beyond the region. Prior to 1934, governing regulations were not applied to grazing activities on public land, and much of the land was heavily grazed. Fluctuations in precipitation and temperature affected the growth of natural rangeland vegetation; this combined with heavy grazing caused many areas to become unsuitable for grazing. The Taylor Grazing Act of 1934, designed to limit grazing to more sustainable levels, prevented the livestock industry from restocking the range with the size of herds grazed in earlier times. In the late 1940s, the Bureau of Land Management first issued public land grazing allotments to Mohave County ranchers.	Mohave County, Arizona
Community Settlement	The earliest Euro-American settlement in the area that would become Mohave County was Fort Mojave, which the U.S. Army established in the Bullhead City area in 1859. In the 1860s, Mormons began to operate ferries on the Colorado River to accommodate expansion of settlement south from Utah. Mormon missionary Jacob Hamblin first ferried across the river east of the confluence with Grand Wash in 1863 and Harrison Pierce developed the ferry in 1876. Bonelli's Ferry or Rioville was established in the early 1870s at the confluence of the Virgin River near present-day Temple Bar. Littlefield, a Mormon agricultural community near the Virgin River, was founded in 1865 and is one of the oldest communities still in existence in the county. Other early settlements in the county included Hardyville, which was established along the Colorado River in 1864 as a distribution and shipping point for mines in the Cerbat Mountains, and the mining communities of Cerbat and Mineral Park. All three of these communities served as the county seat at separate times during the 1870s. Mining towns were populated and abandoned following the "boom" and "bust" of area mines, but some of these communities were able to survive after the mines were no longer considered profitable, including the	Mohave County, Arizona

Action / Project Name	Description	Location
	communities of Oatman, Chloride, and Hackberry. Kingman was founded as a railroad siding along the Atlantic & Pacific Railroad (later known as the Atchison Topeka & Santa Fe Railway) in 1883, and the county seat was moved there in 1887. The railroad and the construction of highway routes beginning in the early 1910s and 1920s supported Kingman's early growth and resulted in the establishment of other smaller communities along these routes. Kingman's growth was given a boost in the 1930s with the construction of the Hoover Dam and continued to grow during the World War II era with the establishment of the Kingman Army Airfield in 1942.	
Hoover Dam	The Hoover Dam is a concrete arch-gravity dam that provides hydroelectric power, water, and flood control to parts of Arizona, southern Nevada, and southern California. The dam, which impounds Lake Mead in the Black Canyon of the Colorado River, is located near Boulder City, Nevada, approximately 25 miles southeast of Las Vegas, Nevada. The Bureau of Reclamation constructed Hoover Dam between 1931 and 1936 during the Great Depression. Hoover Dam is a major tourist attraction; nearly a million people tour the dam each year. The Hoover Dam Bypass, a 3.5-mile-long corridor on U.S. Highway 93, was constructed between 2005 and 2010 to reduce traffic congestion and improve safety at the river crossing near Hoover Dam. (The Hoover Dam Bypass also is discussed under present actions for transportation.)	Clark County, Nevada and Mohave County, Arizona
Lake Mead National Recreation Area	The reservoir that was created by building Hoover Dam became Lake Mead, which was declared a national recreation area in 1964 by Public Law 88-639. The Lake Mead NRA includes two lakes and covers approximately 1.5 million acres of land, but does not include the area managed by Reclamation for the operation of Hoover Dam and Davis Dam. It is characterized by a contrast of desert and water, mountains and canyons, and primitive backcountry and public marinas. P.L. 88-639 directs that "Lake Mead National Recreation Area shall be administered… for general purposes of public recreation, benefit, and use, and in a manner that will preserve, develop, and enhance, so far as practicable, the recreation potential, and in a manner that will preserve the scenic, historic, scientific, and other important features of the area, consistently with applicable reservations and limitations relating to such area and with other authorized uses of the lands and properties within such area." (The Lake Mead NRA also is discussed under present actions for recreation management).	Clark County, Nevada and Mohave County, Arizona
Present Actions / Projects		
Lake Mead National Recreation Area General Management Plan	The Lake Mead National Recreation Area General Management Plan, approved on March 12, 2003, provides broad guidance for decisions about natural and cultural resource protection, appropriate types and levels of visitor activities, and facility development (NPS 2003). The plan describes the area's mission, purpose, and significance, and defines the resource conditions and visitor experiences that should be achieved and maintained over time. One of the plan's objectives is to preserve the visual quality of recreational areas, such as park roads, the lake surface, and hiking routes.	Clark County, Nevada and Mohave County, Arizona

Action / Project Name	Description	Location
Mohave County General Plan	The Mohave County General Plan was adopted in 1995 and updated in 2010. The goals of the plan are to provide basic infrastructure, maintain and protect the County's resources, provide community systems or facilities and services, promote economic development and employment opportunities, encourage affordable housing and a variety of housing types, and improve intergovernmental relations.	Mohave County, Arizona
Dolan Springs Area Plan	The Dolan Springs Area Plan was adopted in 2003 with the goals of ensuring a stable economy through planned growth, promoting core development, encouraging development of adequate and affordable housing, protecting the environment and conserving natural resources, and maintaining a high quality of life and community values.	Dolan Springs, Arizona
Renewable Energy Project	Western Wind Energy operates the Kingman Wind Farm, a 10.5 MW fully integrated combined wind and solar energy generation facility, on 1,110 acres of land owned by the company in Kingman, Arizona. The Kingman Wind Farm began commercial operations on September 24, 2011. The project includes five Gamesa turbines, 500 KW of Suntech Crystalline PV solar cells, a collection system, a substation, roads, interconnection facilities, and a maintenance building.	Kingman, Arizona
Mining Activities	There are federal mineral reserves, mineral districts, potential mining claims, and historic mining areas in the project vicinity. The northeast portion of the Project Area includes two inactive mica, feldspar, and quartz mines, and nearby there are several other closed mine sites, prospect sites, and other mineral features. There are four mining districts east and south of the Project Area: the Cyclopic, Gold Hill, Gold Basin, and White Hills districts—these include numerous, though currently closed mines that were mainly mined for gold and silver in the past. One prospect site for uranium, lead, and zinc is located approximately 8 miles south of the Project Area. The western edge of the Project Area also shares a boundary with a sodium potassium deposit. Mining claims are scattered about this part of Mohave County, largely to the south and east of the Project Area near the aforementioned existing mining districts, but overall it is an area of low favorability for mineral mining. Mercator Minerals Mineral Park open pit copper, silver, and molybdenum mine in the Cerbat Mountains is the only active metallic mine near the Project Area. Four sand, gravel, and/or stone quarries are active in the cumulative impact analysis area: Canyon Sand and Gravel northwest of the Project Area near Highway 93, Kalamazoo Materials' White Hills Pit, Red Mountain Mining's Mineral Park near the Cerbat Mountains, and the Detrital Wash Materials Pits near Highway 93 and the proposed access to the Wind Farm Site.	Mohave County, Arizona

Action / Project Name	Description	Location
Grazing Activities	The BLM Kingman Field Office manages approximately 88 livestock grazing allotments in the region. Forage availability in the allotments is both ephemeral and perennial and most ranching operations on public land in the region are yearlong cow-calf enterprises. Many rangeland improvement projects have been occurring throughout the region. Most allotment boundaries are defined by fences except where natural barriers effectively control livestock. Many allotments are further divided by interior fences to form pastures, which control livestock movement. Numerous range features such as springs, wells, storage tanks, and rain catchments have been developed to provide water for livestock and wildlife. Vegetation treatments have been undertaken and have involved herbicides, prescribed burning, roller chopping, and reseeding of native plants.	Mohave County, Arizona
Off-Highway Vehicle Use	Off-Highway Vehicles (OHV) are used for recreation (e.g., motorcycle racing and rockhounding) and for transportation to recreation sites (e.g., to hunting or camping sites). OHV use is most prominent near populated cities such as Kingman. All BLM-managed land in the area is designated as limited to existing roads, navigable washes, and trails. Limited OHV areas are where vehicle use is restricted at certain times, in certain areas, and/or to certain vehicular use in order to meet specific resource management objectives. Although OHV use in the area is limited to existing roads, trails, and navigable washes, increased OHV use has resulted in a growing network of unauthorized trails.	Mohave County, Arizona
Wilderness	Mount Tipton Wilderness Area: The 30,760-acre Mount Tipton Wilderness is located in Mohave County, 25 miles north of Kingman, Arizona. The wilderness area includes the entire northern half of the Cerbat Mountains. The elevation of Mount Tipton Peak is 7,148 feet and dominates the wilderness. Another scenic attraction at Mount Tipton is the Cerbat Pinnacles, located north of and below Mount Tipton. The Wilderness Area provides a wide range of recreation opportunities including hiking, backpacking, photography, and horseback riding. Development activities that diminish wilderness values are prohibited within the boundaries of this area. Mount Wilson Wilderness Area: The Mount Wilson Wilderness Area encompasses 23,900 acres and is located in Mohave County, Arizona, approximately 30 miles southeast of Las Vegas, Nevada and 60 miles northwest of Kingman, Arizona. The wilderness contains 8 miles of Wilson Ridge and Mount Wilson with an elevation of 5,445 feet. Mount Wilson is the most prominent range in the Hoover Dam area. The area contains several springs which support a wide variety of wildlife, including a population of desert bighorn sheep. Development activities that diminish wilderness values are prohibited within the boundaries of this area.	Mohave County, Arizona

Action / Project Name	Description	Location
Areas of Critical Environmental Concern (ACECs)	Black Mountains ACEC: The 114,242-acre Black Mountains ACEC is designated in the 1995 Kingman BLM Resource Management Plan Record of Decision to protect big horn sheep and wild burro habitat; federal candidate plant species habitat; outstanding scenic values; and rare and outstanding cultural resources. The ACEC is characterized by large mesas and ridges, steep cliffs, rocky foothills, and sandy washes. The highest peak in the mountain range is Mount Perkins with an elevation of 5,456 feet. Joshua Tree Forest / Grand Wash Cliffs ACEC: The 39,060-acre Joshua Tree Forest/Grand Wash Cliffs ACEC is designated in the 1993 Kingman BLM Resource Management Plan Record of Decision to protect unique vegetation; outstanding scenic values; rare cultural resources; and peregrine falcon aerie. The ACEC is characterized by large, scenic stands of Joshua trees set against a backdrop provided by the Grand Wash Cliffs. The area provides outstanding opportunities for dispersed recreation.	Mohave County, Arizona
Electric Transmission Lines	Existing transmission infrastructure present includes the Mead-Phoenix 500-kV Transmission Line and the Mead-Liberty 345-kV Transmission Line (both administered by Western), and the Four Corners-Moenkopi-Eldorado 500-kV Transmission Line (owned and operated by Arizona Public Service).	Mohave, Coconino, Yavapai and Maricopa Counties, Arizona
Transportation Facilities/ Highways	The major transportation feature in the project vicinity is US Highway 93, which provide access to the cities of Kingman, Arizona and Las Vegas, Nevada. That highway is supported by a network of local roads to smaller cities, towns, and communities in the area. The Federal Highway Administration, in conjunction with the Arizona Department of Transportation (ADOT) and the Nevada Department of Transportation (NDOT), officially opened a new segment of US 93, formally known as the Hoover Dam Bypass in October 2010. (The Hoover Dam Bypass also is discussed under past actions for Hoover Dam.)	Clark County, Nevada and Mohave County, Arizona
Triangle Airpark Airport	Triangle Airpark Airport is located east of Highway 93 in White Hills, Arizona. The airport encompasses 115 acres and has two runways, one paved and one dirt. The airport is privately owned by Boulder City Aero Club Inc. and is open to the public with prior written permission required.	Mohave County, Arizona
Urban and Rural Development	Urban development in Mohave County is planned for areas that have already experienced or have been planned for intensive development. Development in the cumulative impact analysis area includes residential development along, and in the vicinity of, Pierce Ferry Road near Dolan Springs and the Lake Las Vegas master planned community west of the Lake Mead NRA in Clark County, Nevada. Other areas of urban development, though more distant to the study area, include land adjacent to incorporated cities, land within outlying communities and the more intensely developing areas such as Golden Valley, which is about 40 miles south of the Project Area and about 10 miles west of Kingman (Mohave County 2010).	Project Area plus 20-mile buffer

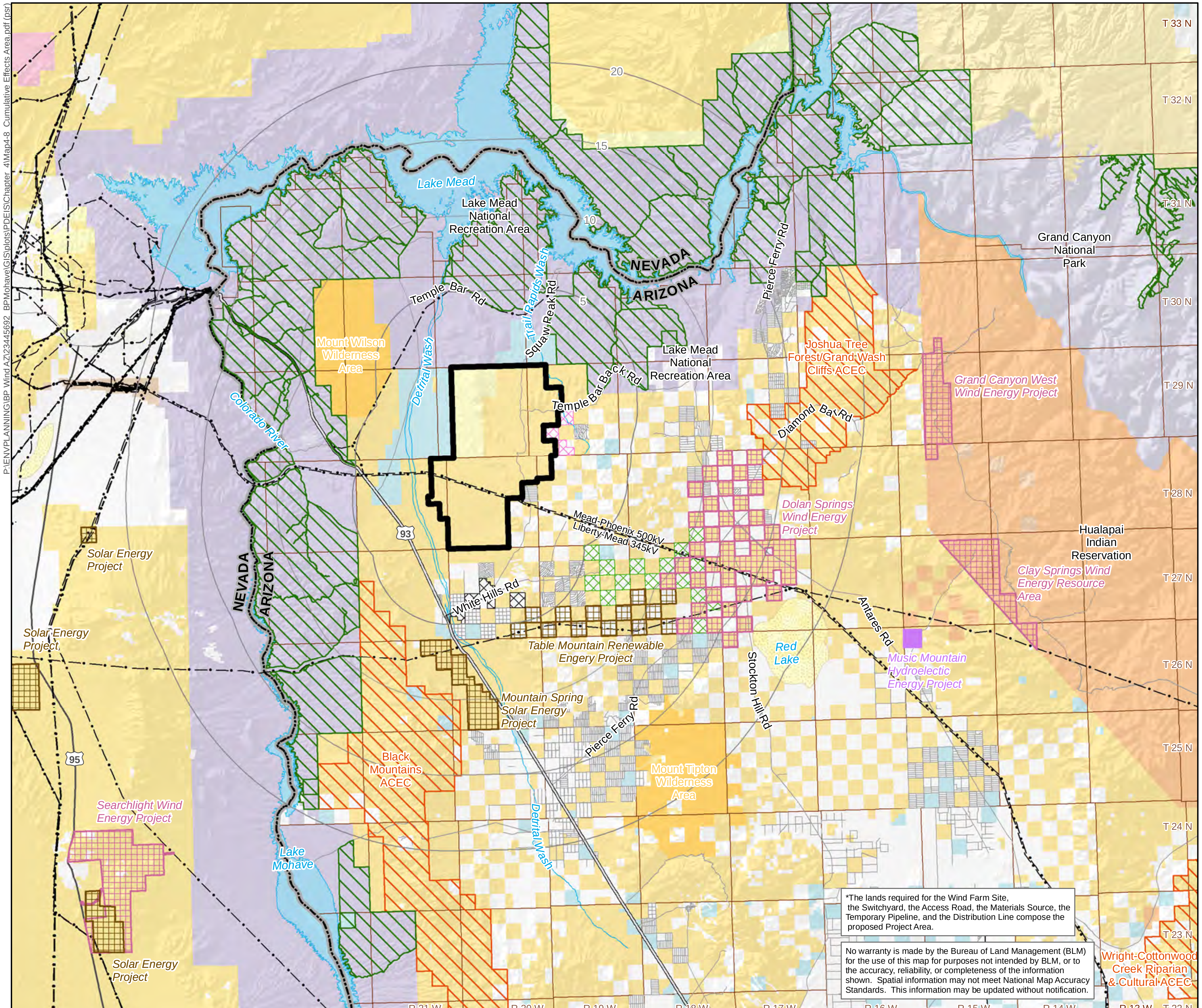
Action / Project Name	Description	Location
Reasonably Foreseeable Future Actions		
Renewable Energy Projects	Multiple applications have been submitted to BLM for rights-of-way on public land for renewable energy projects, including solar and wind facilities. In addition, private lands are being considered for these projects, as evidenced by the Hualapai Valley Solar Energy Project and Table Mountain Renewable Energy Project. Potential projects, irrespective of land ownership, include known potential projects of: • Mountain Spring Solar Energy Project – potential for 250 MW, on 6,700 acres • Dolan Springs Wind Energy Project – MW not yet determined • Grand Canyon West Wind Energy Project – potential for 50 MW generation • Clay Springs Wind Energy Resource Area – potential for up to 150 MW generation • Music Mountain Hydroelectric Energy Project – 450 MW pumping capacity • Table Mountain Renewable Energy Project – renewable energy project using Solar, Wind, and Water recharge on approximately 5,500 acres (potential MW unknown) • Searchlight Wind Energy Project – 200 MW on 18,949 acres In addition, applications for rights-of-way have been filed with BLM for other solar energy projects in Nevada. Though all of these projects have been proposed, some may not be developed in the future; however, for the purpose of the cumulative analysis, additional wind and solar electric generating facilities are expected to be constructed and operated in the vicinity of the Project.	Various locations in Mohave County, Arizona and Clark County, Nevada
Mining Activities	The continued rise in the price of gold, or perhaps uranium, may spark renewed interest in the low-grade deposits of the region but there are no current known plans to reopen old mines or develop a new mine.	Mohave County, Arizona
Electric Transmission Lines	Regional transmission line projects and/or upgrades are anticipated in Northwestern Arizona and Southern Nevada, which may connect to the grid through either the Mead or Eldorado substations. Known projects that have been proposed or approved include: • Southern Nevada Intertie Project – 500 kV • Navajo Transmission Project – 500 kV • Chinook – 500 kV • Zephyr – 500 kV • Centennial West – 500 kV • Sonoran-Mohave Renewable Transmission Project • One Nevada (ON) Line Project – 500 kV • Anova Project – 500 kV • Las Vegas to Los Angeles Transmission Project – 500 kV • Eldorado to Devers – 500 kV • Transwest Express – 500 kV	Various locations in Mohave County, Arizona and Clark County, Nevada

Action / Project Name	**Description**	**Location**
	Some of these transmission projects may not be developed in the future; however, for the purpose of the cumulative analysis, additional transmission facilities are expected to be constructed and operated in the vicinity of the Project.	
Transportation Facilities / Highways	The Arizona Department of Transportation (ADOT) has been and will continue to implement a series of projects to widen and improve US 93 from Wickenburg to Hoover Dam. ADOT's long-term vision is to transform this highly traveled route into a four-lane divided highway through the entire 200-mile stretch. Future projects include Antelope Wash, milepost 101 to 104, and Carrow Stephens, milepost 116 to 119. These projects are scheduled for fiscal years 2015 and 2016. A realignment study for State Route 95 (SR 95) will be completed that would define a new route from Interstate 40 (I-40) to State Route 68 (SR 68), between the Black Mountains to the east and the developed portions of the Colorado River corridor to the west. The project is being studied due to high traffic volumes and long delays on SR 95 between I-40 and Bullhead City.	Clark County, Nevada and Mohave County, Arizona Mohave County, Arizona
Urban and Rural Development	The urban areas in outlying communities will likely continue current patterns of development. The areas appropriate for suburban development primarily are located on the fringes of the urban development areas. The remainder of the unincorporated areas in the County is planned for rural development. Specific future master planned communities have been proposed and approved in the White Hills area, in the vicinity of the Project. Mohave County has included a requirement in the 2005 and 2006 Resolutions to the General Plan to show sufficient development progress on projects before the 2015 General Plan update. It is not known at this time what progress would be made on the proposed and approved developments. The developments identified include: • The Ranch at White Hills and Mardian Ranch • White Hills Central • The Ranch at Red Lake • The Villages at White Hills Over the life of the Project, these master planned communities, or other similar communities including residential and commercial uses, are expected to be developed.	White Hills area of Mohave County

Cumulative impacts would be greatest under Alternative A because it represents the largest Project footprint. Alternatives B, C, and E (Preferred Alternative) would produce a similar degree of cumulative impacts since they would have similar disturbance areas. Alternative D, the no action alternative, would not contribute to cumulative impacts. In the sections that follow, the cumulative effects analysis for each affected element of the environment is presented.

Map 4-8
Projects Considered for Cumulative Effects Analysis

Mohave County Wind Farm Project



*The lands required for the Wind Farm Site, the Switchyard, the Access Road, the Materials Source, the Temporary Pipeline, and the Distribution Line compose the proposed Project Area.

No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Legend

- Wind Farm Site*
- 5-mile Radius Increment

Surface Management

- Bureau of Land Management
- Bureau of Reclamation
- Department of Energy
- Indian Reservation
- Military
- National Park Service
- State Trust Land
- Private
- Bureau of Land Management Wilderness Area
- Bureau of Land Management Area of Critical Environmental Concern (ACEC)
- National Park Service Proposed Wilderness

Planned Development Communities

- The Ranch at Red Lake
- The Ranch at Temple Bar
- The Ranch at White Hills and Mardian Ranch
- The Villages of White Hills

Proposed Renewable Energy Projects

- Solar Energy Development Facility
- Wind Energy Development Facility
- Hydroelectric Energy Development Facility

General Features

- Existing Transmission Line
- U.S. Highway
- Road
- Township and Range Boundary
- River
- Lake
- Dry Lake
- State Boundary

Source:
Project Area Boundary: BPWE North America, Inc 2011
Transmission Lines: Platts, A Division of the McGraw-Hill Companies, Inc. - POWERmap (Platts analytical database: 2009)
Base: ALRIS 2007-2010, BLM 2009 - 2010, ESRI 2008
Renewable Energy Projects: BLM 2011

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4.16.1 Climate and Air Quality

4.16.1.1 Alternatives A, B, C, and E

The air quality in the area is affected by travel on local highways and roads, OHV use for recreational activities, a limited number of industrial facilities in Mohave County, and naturally occurring wind events and dust storms. These activities do not typically degrade the ambient air quality in the area. Dust storms occurring during the monsoon season in the desert may result in temporary, localized exceedances of the NAAQS for particulate matter.

In the areas surrounding the Project boundary, on-road vehicle use is expected to continue at current or increased levels. US 93 has been recently widened from Kingman to the Arizona/Nevada state line to two lanes of traffic in each direction and is a heavily used highway.

There are also residential development plans for master-planned communities in the White Hills area and near Lake Mead NRA that would increase population and therefore likely increase the number of vehicles traveling on local roads and highways, the number of residents participating in OHV-related recreation, and expand commercial development in the area.

Existing industrial facilities that hold Title V (major source) Air Quality Permits include the Mohave Valley Landfill, American Woodmark, Griffith Energy, and the South Point Energy Center. With regard to future industrial development, BLM has received multiple requests for renewable energy projects, including solar, wind, and hydroelectric facilities. As with the proposed wind facility, emissions from these facilities would be greatest during construction, with very low emission levels during operations. Renewable energy projects typically do not require Title V Permits unless they include provisions for backup power generated using combustion equipment requiring fossil fuels.

Since air pollutant emissions occurring during operations would be relatively miniscule (infrequent vehicle use, SF_6 leakage, and emergency generator operation), the analysis of cumulative impacts is focused on emissions from other sources occurring during construction, and having impacts within the same area as the proposed Project. Coarse particulate matter typically emitted by earthmoving and material handling operations (such as the grading and excavation activity, and the CSWP and concrete batch plants) is unlikely to be transported more than a few miles, except on unusually windy days, during which Project emissions would likely be obscured by naturally occurring dust. Additionally, to minimize airborne dust, earthmoving activity (such as road grading or aggregate replacement for road maintenance) would be scheduled during times of low or no wind, would be suspended when wind speeds exceed 22 mph or if gusts exceed 30 mph, based on available meteorological data and disturbed areas would be watered to suppress dust. Section 4.2.7 describes mitigation measures to reduce air pollutant emissions.

Particulate matter and gaseous pollutants resulting from combustion of fuels (such as tailpipe emissions from on-site construction vehicles and equipment, and employee commuting vehicles) are also emitted at or near ground-level, and would likely disperse to immeasurable concentrations within 10 miles. Based on the activities and projects contributing to cumulative effects, no other actions would occur within the 10-mile radius for cumulative analysis of air quality impacts and at times that would overlap with construction of the proposed Project. However, if construction of the Project were to occur simultaneous with other planned or proposed developments (i.e., solar, residential, mineral extraction), some temporary cumulative impacts could occur as a result of the additional particulate matter emissions. The cumulative analysis on air quality assumed that only projects within a 10-mile radius of the proposed action should be considered, since fugitive dust resulting from earthmoving operations tends to fall out well within that distance.

Greenhouse gases would be emitted at increased levels during the maximum18-month construction schedule for the Project. The global warming potential associated with total Project GHG emissions over the 12- to 18-month construction effort was estimated to be 1,113,880 tons of CO2*e*. The GHG emissions from construction and decommissioning of the Project would have an incremental impact on regional climate change, along with other past, present, and reasonably foreseeable future actions. Although the cumulative effects during construction may have a slight, adverse effect on climate change, the operational wind farm would contribute a beneficial long-term impact, because wind farms produce electricity while emitting relatively low quantities of GHGs when compared to fossil-fuel fired generation facilities. Emissions of SF_6 from new electric power substation equipment would meet the applicable IEC standard for leakage rates of <0.5%. If other proposed renewable electric generating facilities are developed, the cumulative impact from these facilities would result in an overall reduction of GHG emissions, since these renewable electric generating facilities do not rely upon fossil fuel combustion. The addition of fossil fuel fired electric generating facilities, either as independent operations or as back-up power for renewable facilities, could result in incremental increases in worldwide GHG emissions.

Although present and reasonably foreseeable future actions in the project vicinity indicate that sources of air pollutants may increase, existing environmental regulations in the State of Arizona are designed to ensure that sources comply with dust control regulations and the NAAQS. Under all action alternatives, impacts from construction and decommissioning would be temporary, and no long-term cumulative impacts are expected.

4.16.1.2 Alternative D – No Action

There are planned residential developments within the 10-mile radius of the Project Area. It is not known when they will be developed, however, if they are developed in the reasonably foreseeable future, some temporary cumulative impacts could occur as a result of the additional particulate matter emissions.

4.16.2 Geology, Soils, and Minerals

4.16.2.1 Alternatives A, B, C, and E

Cumulative impacts on rock, soil, and minerals can occur over a long period of time, resulting in gradual changes in soil and rock erosion potential, ecological function, and mineral access. The impacts on the site soils and rocks would be greatest from actions that involve ground disturbing activities, such as construction for highway improvements and planned developments as well as industrial activities, such as mining. Construction activities have the potential to permanently alter the geology and bedrock of the area of cumulative effects. The primary areas that would be affected are the Lower and Middle Detrital watershed and the Trail Rapids Wash-Lower Colorado River watershed. The two primary impacts stem from the potential for soil erosion due to wind and water movement and the depletion of the Detrital Wash Materials Pit.

The potential for erosion and blowing dust associated with ground disturbance are the major soils concern, although the potential for erosion would diminish over time for those actions that include reclamation to stabilize soils. Other planned projects or developments in the cumulative impact area also could result in soil loss from ground-disturbing activities, particularly during construction. In combination with the Project, the additional projects could result in a long-term loss of soils in the area given the increased disturbance and developed features.

In addition to the Project, improvements to US 93 and other past projects have added to the depletion of the resources located in the Detrital Wash Material Pit; consumption of the extracted materials is irreversible, and future projects may be required to seek materials from one of the existing sand and gravel pits in the vicinity or locate a new source. As a result, permanent cumulative impacts from other planned activities in combination with the Project could include depletion of mineral materials from the Detrital Wash Area. As a result, greater reliance on or development of other mineral material sources could be necessary within the cumulative impact analysis area or in areas further away from the Project Area. Nearby new sources that may be relied upon could include: Fayro No. 4, Gold Crown, Gravel Pit #4, and Mineral Material Area 1,2,3 (U.S. Geological Survey 2011).

4.16.2.2 Alternative D – No Action

Under the No Action Alternative, cumulative effects on geology, soils, and minerals, would be the same as those described under Alternatives A, B, C, and E, except the 180,000 cubic yards of raw materials extracted from Detrital Wash Material Pit would be available for other projects. Even if the Project is constructed, it would require only a portion of the raw materials available in the Detrital Wash Material Pit. This is not to say that the mineral material source would not be depleted in the future, as the area has been previously mined, and would remain available for lease from the BLM. Compared to Alternatives A, B, C, and E, the potential for erosion and blowing would be less unless the BLM issues a mining permit for the Detrital Wash Material Pit to another entity for another project requiring road base material.

4.16.3 Water Resources

4.16.3.1 Surface Water Impacts

Alternatives A, B, C, and E

The types of projects that could contribute to cumulative surface water impacts in the analysis area include solar energy facilities, power/utility line construction and improvements, grazing, mining, and residential developments.

As shown on Map 4-7, Projects Considered for Cumulative Effects Analysis, two solar energy facilities are planned within the cumulative impacts analysis boundary: the Mountain Spring Solar Energy Project and the Table Mountain Renewable Energy Project. Surface disturbance associated with these facilities could have the same types of surface water impacts as the Project, namely stream or drainage modifications, increased runoff, and decreased surface water quality. In combination with the proposed Project, stream sediment loads in Detrital Wash could increase during peak flow events, particularly if the wind farm and solar facilities are constructed at the same time. A number of power line projects have been proposed or approved within the cumulative impacts analysis area (Table 4-31). Construction activities for these projects could create localized surface disturbance that may contribute eroded sediment to nearby ephemeral washes. In combination with the Project, this could increase cumulative sediment loads in Detrital Wash and its tributaries, depending on the timing of cumulative activities. That is, potential compounding of temporary to short-term impacts on surface water quality could occur during construction, if multiple projects were under construction simultaneously during a peak flow event. Similar impacts could occur during decommissioning.

Existing grazing allotments on public land within the analysis boundary could also contribute to cumulative surface water impacts from erosion. Livestock grazing removes vegetation that stabilizes soils and causes rutting along livestock movement corridors. The increase in erosion from rangeland could lead to water quality impacts from increased sediment loads in nearby ephemeral washes. These impacts could combine with construction impacts from the Project to increase sediment loads in Detrital Wash, Trail Rapids Wash, and other unnamed washes within the cumulative analysis boundary, particularly in the short term (i.e., during construction, or similarly, during decommissioning).

Aside from sand and gravel quarries, there are no active mines within the cumulative analysis boundary, and no plans for future mining projects are known at this time. However, cumulative surface water impacts are still possible from historic mine sites in the White Hills, Gold Basin, and Gold Hill mining districts located south and east of the Project (Map 3-4). The reclamation status of these historic mines is currently unknown. Tailings piles left at the mines could act as a source of sediment, dissolved metals, and acid drainage that could degrade surface water quality. Though limited to peak flow events, these mine-related impacts could contribute to surface water quality degradation in the Detrital and Trail Rapids Wash-Lower Colorado River watersheds, in the short term.

Map 4-7, Projects Considered for Cumulative Effects Analysis, shows four planned developments to the east and south of the Project Area that could contribute to cumulative surface water impacts. Construction of these developments would likely modify existing surface drainage characteristics as lots are graded and storm water is routed to drainage channels and retention basins. These changes could affect the Trail Rapids Wash-Lower Colorado River, Lower Detrital Wash, and Middle Detrital Wash watersheds. New road construction for residential development could increase erosion and transport of dissolved and suspended sediment loads to nearby washes. In combination with the Project, this would contribute to cumulative surface quality water impacts, depending on the timing of the activities. Similar to the impacts from renewable energy developments, there could be increased potential for compounding of temporary to short-term impacts on surface water quality during construction or decommissioning, if multiple projects were under construction simultaneously.

Alternative D – No Action

Under the No Action alternative, the past, present, and reasonably foreseeable future actions would have the same cumulative effects on surface water as described under Alternatives A, B, C, and E. Construction of renewable energy projects, livestock grazing, historic mines and planned development could result in erosion and the transport of sediment resulting in short-term impacts to surface water quality.

4.16.3.2 Groundwater Impacts

Alternatives A, B, C, and E

The cumulative impact analysis boundary for groundwater resources is the Detrital Valley groundwater basin. The currently low groundwater demands in the basin (<300 acre-feet per year [ADWR 2009]) are likely to increase in future years due to projected residential development, solar energy projects, and a lack of viable surface water sources. The proposed Project would likely use less water than either residential developments or solar energy facilities.

Future water use by the planned development communities in the cumulative analysis area depends on the density of housing (i.e., number of households per acre), number of people per household, and whether the households are occupied year-round or seasonally. The Ranch at White Hills and Mardian Ranch community would be located immediately southeast of the Project Area, and would occupy approximately eight 640-acre parcels (5,120 total acres, Map 4-7, Projects Considered for Cumulative Effects Analysis). Waskom and Neibauer (2010) have estimated that the typical household uses up to 0.5 acre-feet of water per year to satisfy the demands of a home and lawn. If it is assumed that single-family homes are constructed on 2-acre lots in the Ranch at White Hills and Mardian Ranch development community, and each household consumes 0.5 acre-feet of water per year, this would equate to an estimated 1,280 acre-feet per year of new consumptive water use. These water demands would presumably be supplied from the Detrital Valley Basin-Fill aquifer. Although approximate, the water use estimate for the Villages at White Hills illustrates how water demands for the Project (75.2 acre-feet) would be small compared to the annual requirements of a single development community. The long-term impacts of having four new development communities in close proximity to the Project could include groundwater level declines in the Basin-Fill aquifer and a reduction of groundwater availability in storage. However, the potential for cumulative impacts on groundwater from the proposed Project combined with these developments would be temporary to short-term, as the main groundwater withdrawal for the proposed Project would occur during construction activities. These construction activities likely would be complete before the planned communities would be consuming water.

Use of groundwater during O&M of the Project would be similar to that of a residential well for a single home (approximately 0.1 acre feet per year) and, in combination with the proposed residential development, would not present a quantifiable cumulative impact.

A temporal overlap of groundwater withdrawal would occur during decommissioning, where temporary increases in groundwater withdrawal could incrementally deplete groundwater storage over a temporary to short-term time period.

Proposed solar energy projects in the cumulative analysis area may have high groundwater demands. The Mountain Spring Solar Project south of the proposed Project has been designed as a thermoelectric plant that would use concentrated solar energy to heat water for power production. The POD for the Mountain Spring Project indicates that if constructed, operation of the plant would require an average of 2,000 acre-feet per year consumptive water use (EPG 2008). This quantity is higher than projected construction water use for the proposed Project (75.2 acre-feet). The Mountain Spring Solar Project would be located in the Detrital Valley groundwater basin and would presumably obtain its water supply from the Basin-Fill aquifer. Another solar energy facility, the Table Mountain Renewable Energy Project, could also be built in the Detrital Valley groundwater basin, although water use estimates are not available for the Table Mountain project at this time. Long-term impacts of having two new solar plants in close proximity to the Project could include groundwater level declines in the Basin-Fill aquifer and a reduction of groundwater availability in storage. However, the potential for cumulative impacts on groundwater from the proposed Project combined with these solar projects would be temporary to short-term, as the main groundwater withdrawal for the proposed Project would occur during construction activities. These construction activities likely would be complete before the solar projects would be consuming water. A temporal overlap of groundwater withdrawal would occur during decommissioning, where temporary increases in groundwater withdrawal could incrementally deplete groundwater storage over a temporary to short-term time period.

Alternative D – No Action

Under the No Action alternative, the past, present and reasonably foreseeable future actions would have the same cumulative effects on groundwater as described under Alternatives A, B, C, and E. Construction of other renewable energy projects and planned development could result in water level declines in the Basin-Fill aquifer and reduction of groundwater availability in storage. The cumulative effect on the aquifer and groundwater availability would be long-term due to the on-going groundwater demands that would be created by these projects.

4.16.4 Biological Resources

4.16.4.1 Alternatives A, B, C, and E

The cumulative effects analysis area for vegetation and wildlife other than golden eagles includes the Project Area alternatives plus a 20-mile buffer to the south and east that is limited by the Colorado River on the north and west. This area contains the major natural dispersal barriers and the connected areas surrounding the Project Area, while also limiting the size of the analysis area to a meaningful acreage (about 991,730 acres) to consider the effects. The analysis area for golden eagles includes Project Area alternatives plus a surrounding 90- mile radius, which was defined by using a typical dispersal distance of juvenile golden eagles. Due to the scale of the cumulative analysis, the additional differences among most Project alternatives would be inconsequential, although the no-build area to protect the Squaw Peak golden eagle breeding area that is associated with Alternative E, the Preferred Alternative, would reduce golden eagle impacts relative to Alternatives A, B, and C.

Vegetation, Invasive Plants and Noxious Weeds, and Wildland Fire

The types of projects or actions that could contribute to impacts on vegetation include mining, livestock grazing, urban and rural community settlement and development, planning projects, OHV use, special designation areas, transmission line development, roads and highways, and other renewable energy developments. Historic settlement, mining, and livestock grazing would have started some of the first, widespread, modern surface disturbances in the analysis area, beginning in the 1850s through the 1940s. These would have initiated direct local losses of vegetation and could have started the indirect impacts of fragmenting blocks of vegetation, changing the composition of plant communities, and introducing non-native invasive plants. The introduction of introduced plant species would also have initiated the indirect changes in wildland fire that increased the intensity and decreased the interval of wildland fire over time. Establishment of the BLM, the Taylor Grazing Act, and Lake Mead National Recreation Area would have established the initial areas and authorities to start limiting disturbance and maintaining vegetation communities.

Present local and federal planning efforts and federal land designations have further limited disturbances or better defined methods to manage and protect vegetation resources. Present development of transmission lines, transportation routes, and urban and rural development, along with OHV use, has expanded long-term surface disturbance areas that have further led to the direct loss of native vegetation. These also have led to the long-term increase of areas with indirect impacts that fragment larger vegetation blocks into smaller ones and the means by which invasive plants could degrade native vegetation and change the wildland fire regime.

Future solar and wind energy developments, mining, urban and rural development, and infrastructure developments could result in further subdivision or and loss of native vegetation and would add to the disturbed area where invasive plants or noxious weeds can spread in the analysis area. The direct and indirect long-term disturbance acreage in the Project Area, until revegetation using native plants is complete, would affect about 0.14 percent of the analysis area. In combination, the Project and other past, present, and reasonably foreseeable future actions would result in long-term residual disturbances that would continue to fragment and isolate patches of vegetation, change species composition in plant communities, increase the potential for establishment and spread of noxious weeds and invasive plant species, and keep wildland fire regimes away from historic patterns.

Wildlife (Small Mammals, Reptiles, and Amphibians)

The types of projects or actions that could contribute to impacts on wildlife are the same as those that would affect vegetation. Direct loss of habitat and indirect degradation would have begun in the 1850s through the 1940s. Livestock grazing could have spread invasive plants and altered the cover and composition of plant communities used by wildlife. Mining, urban and rural development, roads, and infrastructure development would have consumed useable habitat and fragmented large blocks of habitats into smaller isolated ones. The establishment of the BLM, the Taylor Grazing Act, and Lake Mead National Recreation Area would have helped to limit disturbances on federally administered lands in the analysis area and would have helped in the direct or indirect retention of habitat for wildlife.

Present local and federal planning efforts and federal land designations have further limited disturbances and preserved vulnerable habitats and species. Present development of transmission lines, transportation routes, and urban and rural development, along with OHV use, have expanded direct loss of habitats and indirect degradation through fragmentation and introduced plant species. Recreational OHV use and transportation along highways also have killed wildlife along roadways.

Future solar and wind energy developments, mining, urban and rural development, and infrastructure developments would result in further subdivision and loss of habitat and direct mortality of some individuals. The direct and indirect long-term disturbance acreage of wildlife habitat in the Project Area, until revegetation is complete, would affect about 0.14 percent of the analysis area. In combination, the Project and other past, present, and reasonably foreseeable future actions would result in long-term impacts that would continue to reduce the size and increase the amount fragmentation and isolation of wildlife habitats in the analysis area. These could exclude some species and reduce the number of species occupying areas affected by disturbance. These also could increase the possibility of reducing the size some populations of species in the analysis area.

Bats

The types of activities and cumulative impacts to bats would be the same as for wildlife, except that past activities would include persecution that could have increased mortality, and proposed future projects that could contribute to increased mortality in the future.

Bats that have chosen temporary night roosts or day roosts at human dwellings likely have been killed in the past. However, current awareness of bats is increasing and is likely improving overall bat conservation in the analysis area. Mining in the past could have disturbed or eliminated roost sites and affected breeding opportunities in mountainous places. Present and future mining could continue to disturb colonies of bats in steep mountainous areas. Historic mines also have increased roosting sites and opportunities for cavernous roosting bats in the analysis area.

Future wind energy developments would kill an undetermined number of bats in the future. If spatial and relative abundance trends of low bat activity observed in the Project Area are consistent in the analysis region, then population-level impacts are unlikely. In combination, the Project and other past, present, and reasonably foreseeable future actions would result in long-term impacts that would continue the possibility of reducing the size some populations of species in the analysis area.

Big Game

The types of projects or actions that could contribute to impacts on big game and the resulting cumulative impacts would be similar to those described for wildlife, but the species could have been impacted by overharvesting in the past and present. Also, habitat fragmentation could be a greater factor for these species due to their need for larger contiguous tracts of land for survival.

Past competitive loss of foraging opportunities between livestock and pronghorn, mule deer, and bighorn sheep and overharvesting of these game species could have led to large population decreases after settlement. Also past and present persecution of mountain lions likely has reduced the population below its natural potential in the analysis area.

Present local and federal planning efforts and federal land designations have further limited disturbances or better defined methods to manage and protect vulnerable habitats for these species. Establishment of the Mount Wilson Wilderness Area and Black Mountains ACEC likely helped to better protect bighorn sheep populations and habitat in those areas.

Present development of transmission lines, transportation routes, and urban and rural development have expanded direct loss of habitats and indirect degradation through fragmentation. High speed vehicle travel along Highway 93 has likely resulted in deaths for all big game species. These present developed uses and disturbances could have lowered the dispersal opportunities.

Future solar and wind energy developments, mining, urban and rural development, and infrastructure developments could result in further subdivision and loss of habitat and direct mortality of some individuals. The direct and indirect long-term disturbance acreage in the Project Area, until revegetation is complete, would affect about 0.14 percent of the analysis area. In combination, the Project and other past, present, and reasonably foreseeable future actions could result in populations being below historical potentials; however, these would likely remain stable into the future, though they may require more intensive management to do so.

Birds

The types of projects or actions that could contribute to impacts on birds include mining, livestock grazing, urban and rural community settlement and development, planning projects, OHV use, special designation areas, transmission line development, roads and highways, and other renewable energy developments. Direct loss of habitat and indirect degradation of habitat from introduced non-native plants and fragmenting of large blocks of contiguous habitat into smaller discontinuous ones would have begun with historic settlement, mining, and livestock grazing in the 1850s through the 1940s. The establishment of the BLM, the Taylor Grazing Act, and Lake Mead National Recreation Area would have provided the initial areas and laws to start limiting disturbance and preserving habitat for birds. Golden eagles and other raptors likely were persecuted and killed to protect livestock in the past.

Present local and federal planning efforts, laws, and federal land designations have further limited disturbances or better defined methods to directly and indirectly protect vulnerable habitats and species. Present development of transmission lines, transportation routes, and urban and rural development, along with use, have expanded direct loss of habitats and indirect degradation through fragmentation and introduced plant species. Buildings, transmission lines, and other built structures likely have led to more fatal bird collisions since initial settlement of the region. Vehicles traveling along highways, particularly Highway 93, would have killed and continue to kill birds that collide with vehicles. Golden eagles and buteos were likely electrocuted as they attempted to perch on old-style transmission lines and transmission poles. Conversely, transmission line towers have increased the availability of nesting platforms for raptors, largely buteos and golden eagles, and perch structures in the analysis region. Consequently, greater foraging opportunities could exist in the region compared to pre-settlement times. Modern design standards to protect raptors from electrocution and to increase visibility of power lines to birds have greatly limited these sources of mortality in the present and into the future.

Future solar and wind energy developments, mining, urban and rural development, and infrastructure developments could result in further subdivision and loss of habitat and direct mortality of some individual birds. Wind energy developments in the analysis area would increase mortality of bird species. The observed trends in the area were that there was a low abundance of resident and migratory birds, lack of migratory flyways, and a majority of species that have a low vulnerability to rotor collisions. If these patterns are similar to other wind energy sites in the analysis area, then it would be unlikely that bird species in the region would experience population-level impacts. The direct and indirect long-term disturbance acreage in the Project Area, until revegetation is complete, would affect about 0.14 percent of the analysis area for birds other than golden eagles. In combination, the Project and other past, present, and reasonably foreseeable future actions would not eliminate any species from the analysis area, but could increase the possibility of individual deaths in some species.

The total direct and indirect long-term disturbance acreage in the Project Area would be less than 0.009 percent of the analysis area for golden eagles. Also, a recent study of population trends of golden eagles across the West indicate that the population in the analysis area is likely stable (Nielson et al. 2010), but recruitment of juvenile eagles may have declined over a 5-year period (2006-2010). The authors were hesitant to attribute a cause to trends in the data and also stated that the breeding segment of the population may be stable despite the decrease in the number of juveniles (Nielson et al. 2010). With mitigation measures proposed in the ECP/BCS for this Project, any deaths of golden eagles from this wind farm could be offset by reducing deaths from other possible sources in the region. In combination, the Project and other past, present, and reasonably foreseeable future actions would not affect larger regional trends in the golden eagle population.

Special Status Species

BLM Sensitive Plants

The types of projects that could contribute to cumulative impacts on silverleaf sunray habitat and populations in the analysis area include solar energy facilities, transmission line construction and improvements, livestock grazing, and roadway, mineral and residential developments. Under all alternatives the amount of short-term surface disturbance from the Project would be less than 0.1 percent of the analysis area. Surface disturbance from the Project and other solar energy facilities, transmission lines, roadway and mineral developments could disturb potential habitats. Projects requiring federal and/or state permits would be required to conduct preconstruction surveys to identify and avoid silverleaf sunray populations; however, avoidance of all populations and suitable habitat may not be possible. Reclamation would restore these areas, but restored areas may not be able to support the species. Residential development also could result in surface disturbance of habitat and indirectly reduce adjacent suitable habitat, if landscaping introduced new vegetation species to undisturbed areas.

Long-term the surface disturbance from the Project and other surface disturbance could alter suitable habitat if invasive species were introduced or soils were damaged during development activities. In combination, the Project and other past, present, and reasonably foreseeable future actions could reduce the larger regional population. However, these long-term indirect impacts from development could be reduced if BLM or other federal, state, or local agencies require adherence to development guidelines and Integrated Reclamation Plan in areas disturbed by the Project and other actions.

Protected Arizona Native Plants

Similar to the cumulative effect described for BLM sensitive plants, surface disturbance to populations and habitats of the Las Vegas bear poppy, cottontop cactus, straw-top cholla, and Navajo Bridge cactus and other salvage restricted species, would be similar to those described in the previous subsection for the silverleaf sunray except there could be the loss of individual cottontop cactus and other salvage restricted plants. This would result in a minor direct impact if it reduced the number of individual plants within the analysis area. Preconstruction surveys to identify populations of these species can identify avoidance areas where practicable; however, in site-specific areas where this is not possible, individual plants can be transplanted to a suitable site within the analysis area. Cumulative impacts would be reduced by following native plant salvage measures developed in a native plant salvage plan (if required) for the Project and other surface disturbing activities on federal and state lands. Reclamation, plant salvage and revegetation would reduce long-term indirect impacts on individual plants and their habitats from the Project in combination with other past, present, and reasonably foreseeable actions. Depending upon the extent of surface disturbance, mineral and residential development on private lands where no federal or state permits are required could reduce the number of salvageable plants in the analysis area.

Federally Listed Wildlife

The Sonoran desert tortoise (or Morafka's desert tortoise) is a federal candidate species that inhabits the analysis area. Surface disturbance from the construction of solar energy facilities, transmission line construction and improvements, and roadway, mineral and residential developments could result in the cumulative loss of individuals and habitat. Under all alternatives the amount of short-term surface disturbance from the Project would be less than 0.1 percent of the analysis area with Alternative A having the greatest extent of surface disturbance. Long-term surface disturbance from the Project and other cumulative actions could reduce or degrade desert tortoise habitat where vegetation would be cleared for construction; however, the Project would result in a small long-term loss as reclamation and revegetation would restore habitats on all but about 317 acres that would be required for the Project. The construction of the Project and other actions also could result in the short-term loss of individuals and burrows; however, preconstruction surveys would reduce the effects on the individuals of the local population.

Transportation improvements, access roads for transportation, transmission lines, mining and residential development in addition to the Project could reduce the integrity of desert tortoise habitat and the loss of dispersal habitats in the analysis area. Long-term, the reduction in habitat integrity could result in indirect impacts to the tortoise population if it reduced habitat quality, limited movement, or altered forage. Vehicle traffic on roads including interior roads for the Project could increase the potential for vehicle mortality and the loss of individual desert tortoises in the analysis area. In combination, the Project and other past, present, and reasonably foreseeable future actions could result in tortoise populations decreasing their natural potential; however, these could remain stable into the future, though they would require more intensive management to do so.

BLM Sensitive Wildlife

Cumulative impacts to BLM sensitive wildlife (5 bat species and 4 bird species) would not substantially differ from those described for bats and birds. The combined cumulative impacts from the Project with past, present, and reasonably foreseeable future actions likely would not result in population level impacts to the species but could increase the possibility of individual deaths near disturbance sites.

Arizona Wildlife of Concern

Cumulative impacts to other Arizona wildlife of concern (the Mexican free-tailed bat, Gila monster, and 20 bird species) would not substantially differ from those described for bats, wildlife, and birds. The combined cumulative impacts from the Project with past, present, and reasonably foreseeable future actions likely would not result in population level impacts to the species but could increase the possibility of individual deaths near disturbance sites.

4.16.4.2 Alternative D – No Action

Under the No Action alternative, the past, present, and reasonably foreseeable future actions would have the same cumulative effects on biological resources as described under Alternatives A, B, C, and E. Cumulative impacts from mining, livestock grazing, urban and rural community settlement and development, planning projects, OHV use, special designation areas, transmission line development, roads and highways, and other renewable energy developments could alter fire regimes, wildlife, and special status species habitat. The effects would be less than under the action alternatives due to the decrease in surface disturbance.

4.16.5 Cultural Resources

4.16.5.1 Alternatives A, B, C, and E

The analysis area for cumulative impacts was defined as extending 20 miles from the proposed Project Area, which is the extent of consideration of potential visual impacts on cultural resources. The time frame for cumulative direct impacts is generally permanent because disturbed or destroyed cultural resources are nonrenewable.

Only a small fraction of the approximately 2,100 square miles of the cumulative impact area has been surveyed for cultural resources, and information about cultural resources within the analysis area is incomplete. The cultural resource overview and survey plan that was prepared for the Project documented that site densities recorded by documented surveys varied considerably. The highest density was about 26 sites per square mile, but that survey covered only 200 acres and was in an area of intense historic mining activity around the Cyclopic Mine and nearby springs. The five most extensive surveys, which are more representative of the region, averaged about 4 sites per square mile (Rogge 2010). That suggests there could be on the order of 8,000 cultural resources within the analysis area. The results of the survey conducted for the Project indicates that a considerable proportion of the sites reflect historic transportation, grazing, and mining activities, and about half of the sites are likely to be important and retain integrity (Kirvan et al. 2011).

The identified past, present, and reasonably foreseeable residential and solar and wind projects are estimated to involve disturbance of approximately 100 square miles, which could disturb or destroy approximately 400 cultural resource sites or 5 percent of the cultural resources within the analysis area. Other past actions, such as the construction of roads and power lines, mining and ranching activities, and the filling of Lake Mead, disturbed or destroyed other cultural resources. Although the extent of those disturbances is not readily quantifiable, much of the analysis area remains undeveloped, and thousands of cultural resources probably remain intact but have yet to be discovered and recorded. Historical and archival documents, oral histories, and archaeological evidence indicate that the more intensively occupied ancestral Hualapai sites were located in the hills surrounding the immediate Project Area. If sites of that type do exist in the vicinity of the Project, increased human presence also may lead to cumulative impacts to those sites.

Almost half of the analysis area is managed to conserve natural and cultural resources, including the Joshua Tree-Grand Wash Cliffs and the Black Mountains Ecosystem Management ACECs, Mount Wilson and Mount Tipton Wildernesses, and Lake Mead NRA. Potential impacts of uses of public land managed by BLM and State Trust land also would be considered for projects proposed in the future, and measures to avoid or reduce or mitigate impacts on important cultural resources are likely to be implemented.

The cultural resources that would be directly affected by the four action alternatives are a small fraction of a percent of the cultural resources within the cumulative impact analysis area, and impacts on those resources would be avoided or mitigated to the maximum extent practicable. If disturbance is unavoidable, recovery and preservation of artifacts and information and other potential mitigation measures would be implemented in accordance with Section 106 consultation. Any residual direct impacts would not represent a significant cumulative impact to those of other past, present, and reasonably foreseeable future actions.

The proposed Project in combination with other reasonably foreseeable projects, including other planned renewable energy and residential development projects, could result in cumulative indirect impacts on Wi Knyimáya (Squaw Peak) and Wi Hla'a (Senator Mountain), which are National Register-eligible traditional Hualapai cultural resources. Cumulative impacts resulting from most types of infrastructure development projects are likely to be long-term because those facilities probably would be present for decades, but visual impacts of the wind farm could be largely reversible with decommissioning of the Project at the end of its use life and restoration of the landscape.

4.16.5.2 Alternative D – No Action

The No Action alternative would reduce the potential of impacts on cultural resources in addition to those of reasonably foreseeable projects in the cumulative impacts analysis area, which are primarily utility and residential projects south and east of the Project Area. The reduction of direct impacts would be minor because only a few cultural resources would be disturbed by construction and operation of the Project and they represent only a fraction of one percent of the cultural resources within the analysis area. The No Action alternative would result in a greater reduction of potential indirect impacts on Wi Knyimáya (Squaw Peak), Wi Hla'a (Senator Mountain) because strings of tall wind turbines would not be constructed over a large area northwest of where other future residential and renewable energy projects are most likely to be built.

4.16.6 Paleontological Resources

4.16.6.1 Alternatives A, B, C, and E

Projects involving the construction of new facilities within the vicinity of the Project Area include renewable energy projects, mining, electrical transmission lines, transportation facilities/highways, and urban and rural development. Of these, urban and rural development would have the greatest potential impact to paleontological impacts in the White Hills area of Mohave County, because this type of ground disturbance occurs on private land and would not require the evaluation and monitoring activities associated with federal actions. Paleontological resources are affected primarily from subsurface soil disturbances, which include grading, digging for foundations, and trenching for utilities. These activities, from urban and rural development in combination with the proposed Project, could result in a permanent cumulative decrease in the overall amount and density of paleontological resources which are nonrenewable resources.

4.16.6.2 Alternative D – No Action

Under the No Action alternative, the past, present, and reasonably foreseeable projects and actions would have the same cumulative effect on paleontological resources as described under Alternatives A, B, C, and E. Subsurface soil disturbance within the cumulative impact analysis area could result in a decrease in the amount and density of paleontological resources, but this would be less than those under the action alternatives.

4.16.7 Land Use

4.16.7.1 Alternatives A, B, C, and E

The cumulative impact analysis boundary is the Project boundary plus a 20-mile buffer including electric transmission systems. The potential for cumulative land use, recreation, and livestock grazing impacts exists where there are multiple planned projects in the same area. Cumulative impacts on land use could result from numerous existing and proposed industrial developments adjacent to the Project Area, including, mining, renewable energy, and transmission lines. Cumulative impacts to mining were discussed in Section 4.16.2, and are not repeated here.

Implementation of the proposed Project and proposed future renewable energy development projects (such as the Dolan Springs wind project and the Table Mountain and Mountain Spring solar energy projects) and future transmission lines would add new industrial facilities to the area. Increased renewable energy development could drive the demand for the use of new and existing right-of-way corridors for transmission lines, pipelines, distribution lines, and roads to support the construction of the planned facilities. As industrial development occurs, the existing rural environment would become increasingly industrial and contribute to changing the historic rural lifestyle on adjacent residential properties and could encourage future collocation of other industrial projects. In combination with the proposed Project, other renewable energy or industrial developments could cumulatively diminish the visual quality of the recreation setting and the recreation experience to users of the area over the long term based on the additive effects of the projects (and additional associated infrastructure).

The Lake Mead NRA General Management Plan describes the area's mission, purpose, and significance, and defines the resource conditions and visitor experiences that should be achieved and maintained over time. Over the long term, the proposed Project combined with future renewable energy development and residential communities could conflict with the plan's objective to preserve the visual quality of recreational areas, such as park roads, the lake surface, and hiking routes.

Implementing the proposed Project and proposed future renewable energy development projects, transmission lines, and residential communities could indirectly result in short-term cumulative impacts on those visiting the proposed wilderness areas in Lake Mead NRA. Construction of associated infrastructure could increase vehicle traffic and cause temporary delays for those visitors trying to access the proposed wilderness areas. Impacts would be indirect, minor, short-term and occur only during construction. If residential communities and additional access roads are constructed near the proposed wilderness areas, this could indirectly increase or improve access for those visiting the proposed wilderness areas. Impacts would be indirect, minor, and long-term.

If construction on several proposed actions in close proximity occurred simultaneously, cumulative short-term impacts on recreation and residential property could occur from noise and increased traffic from industrial construction vehicles. Impacts associated with increased noise and traffic from construction activities would be temporary, but there may be residual traffic and noise following construction from operational use and/or activities associated with the new development.

In combination with the proposed Project, if future master planned communities, including the Ranch at White Hills and Mardian Ranch, are developed, this could contribute to a conversion of land from undeveloped open space lands to residential and/or commercial lands. Similar to the addition of other renewable developments, these projects together could cumulatively diminish the visual quality of the recreation setting and experience to users of the federal and state lands in the area over the long term.

A recent zoning proposal for a helicopter landing site nearby was withdrawn; however, according to Mohave County representatives, it is likely that there will be similar proposals involving helicopter tours. The location of the landing sites may be affected because aircraft would not be able to operate at low levels within the airspace over the Project Area because of the obstructions, which could influence take-off and landing patterns. The turbines would add an obstruction to small aircraft that may fly near or over the Project Area. In addition, the distribution line that may extend along US 93 and along the primary access road to support the O&M building would add a new obstruction and potential flight safety concern. In combination, the proposed Project and a helicopter tour operation, if one were proposed, could not occur in the same location, but the availability of undeveloped land in the region would not preclude helicopter landing sites in the broader area. The opportunities for recreational helicopter touring would not be affected, but the Project components in combination with helicopter tours could contribute to noise and visual intrusions which could influence recreational experiences, particularly for those seeking a natural setting.

4.16.7.2 Alternative D – No Action

Under the No Action alternative, implementation of proposed future renewable energy projects, transmission lines, industrial facilities, and residential communities would contribute to a land use conversion from undeveloped open space lands to residential and/or commercial lands. The associated infrastructure could reduce the visual quality of the recreation setting and experience. If the projects include new access roads, this could indirectly improve access and opportunities for motorized recreation. Loss or damage to vegetation during construction could indirectly impact livestock forage availability in localized areas if projects are constructed within grazing allotments. Construction of proposed projects could increase vehicle traffic and cause temporary delays for those visitors trying to access Mount Wilson

Wilderness Area. The associated cumulative impact from these actions would be similar to the cumulative impacts as described under the Action Alternatives, except disturbance at the Wind Farm Site would not contribute to the land use changes, and cumulative impacts would not occur on the private airstrip.

4.16.8 Transportation and Access

4.16.8.1 Alternatives A, B, C, and E

The proposed Project is located in an area with few major regional highways (US 93) combined with a series of local access roads. Planned actions, including the proposed Project, other renewable energy projects, and future master planned communities, would contribute to an expanded network of access routes, but would also add to the amount of traffic on existing routes by bringing more people to the area. Construction of the other renewable energy projects and master planned communities is not expected to overlap with the construction of the proposed Project, which limits the potential for temporary cumulative effects on transportation and access in the immediate Project Area. In the case of the proposed Project and other energy projects, the increase in traffic would be mostly limited to construction or decommissioning (short-term impacts), whereas residential development would have a long-term effect on traffic volumes. However, in combination with the proposed Project, traffic from the proposed residential development could create temporary cumulative impacts on transportation and access during the decommissioning of the Project.

ADOT is in the process of widening and improving US 93 between Wickenburg and the Hoover Dam, which would better accommodate traffic flow when industrial development projects require the use of US 93 to bring equipment and materials to construction sites. All improvements to US 93 within the identified cumulative impacts area have been completed, and no additional projects are planned at this time. Consequently, during construction of the Project under the action alternatives traffic flow in this area would not be compromised by the combination of slow-moving vehicles and oversized loads being hauled through road construction zones.

The implementation of the roadway improvement project to widen and improve US 93 from Wickenburg to Hoover Dam as well as the recent construction of the Hoover Dam bypass would provide a long-term beneficial effect to the residents and traveling public in the area. Roadway improvements, including the transformation of the existing US 93 into a divided four-lane highway along its entire 200-mile stretch, would provide increased safety when considering the potential increase in planned housing developments and other renewable energy projects in the cumulative effects analysis area.

4.16.8.2 Alternative D – No Action

Under the No Action alternative, the past, present, and reasonably foreseeable project and actions would have the same cumulative effect on transportation as described under Alternatives A, B, C, and E. However, there would be no impacts related to increased traffic or delays due to the proposed Project since the Project would not be built under Alternative D.

4.16.9 Social and Economic Conditions

4.16.9.1 Alternatives A, B, C, and E

Cumulative impacts of the Project and other reasonably foreseeable future projects on socioeconomic conditions, including population, housing, employment, income, and quality of life are described in this section. Projects considered for the cumulative analysis include two proposed solar energy projects: Mountain Spring Solar Energy and Table Mountain Renewable Energy Project, as well as the Dolan Springs Wind Energy Project. There are also four proposed or approved residential development communities considered in the analysis: The Ranch at Red Lake, White Hills Central, the Villages of

White Hills, and the Ranch at White Hills and Mardian Ranch. These projects would convert lands in the County from undeveloped open space and increase the industrial, commercial, and residential land uses in the study area, changing the area from predominantly rural conditions and affecting the rural way of life in the area.

Cumulatively, the developments in Mohave County, including the proposed Project, would increase employment and income opportunities as well as increase population and housing in the region over the long term. Associated with increased population, there would be expected increases in traffic and noise. There would also be decreased acreage of open space, with potential reduction in semi-primitive outdoor recreation and wildlife viewing opportunities, as well as potential temporary reduction in air and water quality conditions within and near the Project vicinity, especially during construction periods.

4.16.9.2 Alternative D – No Action

Under the No Action alternative, implementation of proposed future renewable energy projects, transmission lines, industrial facilities, and residential communities would contribute to the employment and income opportunities, and increase in population and housing over the region. The associated cumulative impact from these actions would be similar to the cumulative impacts as described under the Alternatives A, B, C, and E, except there could be less effect on employment and income opportunities.

4.16.10 Environmental Justice

4.16.10.1 Alternatives A, B, C, and E

Cumulatively, the environmental justice effects of the proposed renewable energy projects and proposed residential development project in Mohave County would tend to increase employment and income opportunities in the region, which may help to reduce the proportion of low income households in the area and thereby reduce environmental justice effects over the long term. There could also be potential temporary reductions in air and water quality conditions within and near the Project vicinity, especially during construction periods, as well as decreased acreage of open space, with potential reduction in semi-primitive outdoor recreation and wildlife viewing opportunities. There may therefore be environmental justice impacts related to quality of life over the long term. Due to the rural nature of the area as well as the types of foreseeable future developments, it is anticipated that potential environmental quality impacts would result in negligible environmental justice effects related to human health in the long term.

4.16.10.2 Alternative D – No Action

Under the No Action alternative, implementation of proposed future renewable energy projects, transmission lines, industrial facilities, and residential communities would contribute to a land use conversion from undeveloped open space lands to residential and/or commercial lands. The associated cumulative impact from these actions would be similar to the cumulative impacts as described under the Alternatives A, B, C, and E, except disturbance at the Wind Farm Site would not contribute to the possibility of income and employment opportunities, and not add to the possibility of long-term environmental justice impacts related to quality of life over the long term.

4.16.11 Visual Resources

4.16.11.1 Alternatives A, B, C, and E

The analysis area for cumulative impacts was defined by a 20-mile radius surrounding the proposed Project. The analysis focused on the viewshed of the proposed Project within the Detrital Valley; however, areas outside the viewshed were considered if a clear nexus with direct or indirect impacts of the proposed Project would exist. The cumulative impacts analysis was based on the extent to which the natural and existing landscape character of the analysis areas would be transformed to a more developed character as a result of past, present, and reasonably foreseeable future actions. The intensity of impacts was defined by the expected level of visual contrast, and geographic extent of perceived contrast.

Past actions in the analysis areas that have influenced visual resources include the Town of White Hills (established in 1890), the US 93 highway corridor, local connector roads, the Detrital Wash Materials Pit, access roads leading to the Lake Mead NRA and Grand Canyon NP, and the high voltage Liberty-Mead and Mead-Phoenix transmission lines. Development outside the Valley includes the Hoover Dam and Lake Mead reservoir, including recreational facilities within the NRA. These actions have generally resulted in low intensity and localized impacts to visual resources; however, the contrast of Lake Mead against the surrounding arid landscape would be considered strong. Several reasonably foreseeable future actions for the analysis area may affect visual resources, including residential development (Ranch at Red Lake, the Ranch at Temple Bar, the Villages of White Hills, and the Ranch at White Hills and Mardian Ranch) and renewable energy projects (Mountain Spring Solar Energy Project, the Dolan Spring Wind Energy Project, and the Table Mountain Renewable Energy Project).

The proposed Project, combined with other reasonably foreseeable utility-scale energy projects would result in strong visual contrast and a transformation of the area to a more industrial setting when viewed during both day and night conditions over the long term. The expansion of residential areas would expand the footprint of developed areas through the addition of structures, roads and electrical distribution lines and associated visual contrast. The expanded developed area would be particularly evident during night time conditions, when lighting would extend from the Dolan Springs Wind Energy Project southwest to the Mountain Spring Solar Energy Project. Impacts of combined actions would be perceived as strongest where viewed by sensitive viewers in the White Hills residential area, traditional areas identified by the Hualapai Tribe, and the Mount Tipton and Mount Wilson Wilderness Areas. Indirectly, these changes could result in a long-term reduction in visual sensitivity within the affected landscape and could increase visual sensitivity in adjacent areas where development is limited.

4.16.11.2 Alternative D – No Action

Under the No Action alternative, the past, present, and reasonably foreseeable projects and actions would have the same cumulative effect on visual resources as described under Alternatives A, B, C, and E. Renewable energy projects south and east of the Project Area and proposed community developments could have cumulative effects on sensitive viewers in the White Hills residential area and in the traditional cultural area of Senator Mountain depending on which direction they would be looking. However, compared to Alternatives A, B, C, and E, the cumulative effect would be less for the sensitive viewers in the White Hills residential area and in the traditional cultural area of Senator Mountain.

In the proposed Project Area, and the land to the north and west, there are no reasonably foreseeable future land uses except designating portions of Lake Mead NRA as wilderness. Therefore those areas would retain the natural landscape with the associated views. Under the No Action alternative, viewers at the traditional cultural areas of Squaw Peak, and Mata Thi:ja, along Temple Basin Road, and in the Lake Mead NRA would not experience any change from the existing or reasonably foreseeable conditions.

4.16.12 <u>Public Safety, Hazardous Materials, and Solid Waste</u>

4.16.12.1 Alternatives A, B, C, and E

Elements comprising potential cumulative impacts include occupational and public health and safety, and hazardous materials and solid waste.

Occupational and Public Health and Safety

The cumulative impacts analysis area with regard to occupational and public health and safety is the Project boundary, along travel routes US 93 between Hoover Dam, the intersection of Pierce Ferry Road and White Hills Road, and unpaved, unmarked access roads within 5 miles of the Project boundary.

Planning and preliminary project activities are underway for the identified renewable energy projects within the cumulative impact analysis area. Each of these new facilities would likely require the presence of heavy equipment and use of the local roads for transport of construction materials and materials associated with plant operations, creating temporary congestion on the roadways that would increase the probability for accidents during construction. An increase in employees traveling to and from work also would contribute to the risk of increased roadway accidents, particularly if construction of multiple facilities occurred simultaneously, which is not expected at this time. However, should that occur, these cumulative impacts could result from those planned projects in conjunction with the proposed Project.

The future master planned communities and residential developments are within close proximity to the Project Area, which would result in the potential for an increase in the number of residents using the local roadways. Combined with the increase in large trucks with oversized loads related to the potential renewable energy projects, a greater risk of traffic accidents would occur. However, the planned communities may not be developed prior to the project construction, but they could be in place at some time during operation or by the time of decommissioning. As a result, the combination of additional vehicles and more roadway users could increase production of dust, resulting in temporarily reduced visibility in the area and the potential for adverse health impacts to occur.

It is likely that most of the proposed renewable energy projects would use and/or dispose of hazardous materials and wastes. While compliance with federal, state, and local requirements for handling and disposal of these materials would be required, it is possible that an accidental spill could occur, resulting in cumulative impacts, although slight, in the long term when combined with the proposed Project.

Hazardous Materials and Solid Wastes

The various renewable energy projects planned near the Project Area would likely utilize or produce many of the same hazardous materials that were discussed in Section 4.13.2.3 for this Project, such as lubricants, fuels, combustion emissions, and explosives, and would generate some hazardous wastes that would need to be disposed of at a regulated facility. The risk of accidental hazardous materials and waste spills would increase, but with proper training and observation of federal, state, and local requirements, little or no adverse impact to surrounding properties would be anticipated.

4.16.12.2 Alternative D – No Action

Under the No Action alternative, the past, present, and reasonably foreseeable future projects and actions would have the same cumulative effect on occupational and public health and safety as described under Alternatives A, B, C, and E. If the other planned renewable energy projects in the study area are constructed, the increased risk of roadway accidents due to the presence of heavy equipment and large trucks used for construction would be similar to Alternatives A, B, C, and E. However, under the No Action Alternative, the possibility of simultaneous construction activities would be removed, which would lower the risk of roadway accidents. Likewise, if the future master planned communities are developed, there is also potential for increased residential traffic associated with those communities and a greater risk of roadway accidents.

The potential for accidental spills or contamination of hazardous materials is also present from the other renewable energy projects and mining operations, but all projects would be required to use and/or dispose the materials and wastes in accordance with federal, state, and local requirements.

4.16.13 <u>Microwave, Radar, and Other Communications</u>

4.16.13.1 Alternatives, A, B, C, and E

Because no impact on microwave radar and other communications would occur as a result of the proposed Project or alternatives, no cumulative impacts are analyzed.

4.16.13.2 Alternative D – No Action

Because no impact on microwave radar and other communications would occur as a result of the proposed Project or alternatives, no cumulative impacts are analyzed.

4.16.14 <u>Noise</u>

4.16.14.1 Alternatives A, B, C, and E

Known existing and future development in the vicinity of the Project that is more than 5 miles away from the nearest turbine associated with the Project would be sufficiently distant to support a reasonable expectation of no cumulative noise impact resulting from any project alternative under consideration. This is due to natural sound attenuation primarily from geometrical divergence, ground absorption and air absorption.

Construction of new residences and commercial enterprises occurring on current privately-owned parcels or subdivisions that are within 5 miles distance from the Project boundary would create noise that is temporary, resulting in additional noise in the short term during construction, particularly if construction occurs simultaneously. However, this temporary noise is excluded from Mohave County Zoning Ordinance limits. The planned residences and commercial enterprises would introduce potential sources of operation noise such as heating, ventilation, and air conditioning equipment; vehicle operation; generators; pumps; other equipment; and human activities that would be logarithmically additive over the long term, which would help raise ambient outdoor sound above existing levels that currently include contribution from existing land uses and other natural and man-made sources (e.g., road traffic, aircraft overflights, etc.). The actual rise in ambient sound level would depend on proximity of the receptor or measurement location to the new noise source. The change in ambient sound level also would be influenced by potential sound reductions due to the potential displacement or re-routing of noise-producing actions (such as helicopter routes) resulting from construction and operation of the Project.

The contribution of the Project's turbine operation noise towards a cumulative or future ambient outdoor sound level of 45 dBA L_{eq} (i.e., the suggested guidance threshold considered appropriate for residential areas) that includes noise from these existing proposed and future developments is expected to be negligible beyond the outermost 35 dBA L_{eq} contour displayed in Maps 4-1 through 4-6 from Section 4.15.2. This is because the logarithmic sum of two sound levels that differ by more than 10 dBA is essentially the larger of the two.

The likelihood of the Project making a significant contribution to a cumulative level of 45 dBA L_{eq} depends on the receptor or measurement location proximity to the Project and the magnitude and proximity of other sources. For example, if anticipated noise from the Project was 42 dBA L_{eq} at the boundary of a residential land use, a non-Project ambient or background level of 42 dBA L_{eq} would produce a result of 45 dBA L_{eq} (i.e., the logarithmic sum of two equal sound levels is 3 dBA higher than one of the levels).

As the logarithmic addition of two equal levels can never be greater than 3 dBA, the Project's anticipated cumulative effect would never be greater than 3 dBA—a modest gain considered slight but detectable by the average healthy human ear. In other words, as inequity between the Project noise and non-Project background sound grows (which means either the Project noise or the non-Project background sound would be more dominant at a given location), the cumulative effect diminishes towards zero.

4.16.14.2 Alternative D – No Action

Under the No Action alternative, development of new residential and commercial land uses would occur as described under the Action Alternatives. Reasonably foreseeable future projects would contribute to the amount of development in the area, raising the ambient sound level of the Project vicinity. The cumulative rise in ambient sound level depends on receiver location and the types and proximity of noise generating activities. For example; residential and industrial (renewable energy projects, mining, etc.) development could influence the locations of recreational activities (such as driving off-road vehicles) that also create noise. Therefore, the pattern of development would influence the ambient sound level for any given location.

4.17 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

A commitment of resources is irreversible when its primary or secondary impacts limit the future option for a resource. An irretrievable commitment refers to the use or consumption of resources neither renewable nor recoverable for later use by future generations, and represents a permanent effect.

Implementation of any of the action alternatives involving construction would require a commitment of natural, physical, human, and fiscal resources. Construction and operation of any of the action alternatives would require similar commitment of these resources. This discussion focuses on:

- The Project's use of nonrenewable resources during construction and operation, which includes fossil fuels, electricity, water, mineral materials, cement products, and labor; and
- The changes expected to occur as a result of the proposed Project including the commitment of land for the proposed Project, physical changes in the environment, effects on human populations, and fiscal changes.

For all the action alternatives, Alternative A would represent the greatest impact to irreversible and irretrievable commitments of resources, as well as unavoidable adverse impacts because this alternative would have the largest footprint and number of turbines.

Alternatives B, C, and E would have smaller construction and operation impacts because the footprint of the Project, and the associated resources used to construct the Project would be less than Alternative A. It should be noted however, that the construction of fewer turbines would mean constructing turbines with higher generation capacity to satisfy the interconnection agreements and Western's tariff.

The No Action alternative would represent no irreversible and irretrievable commitment of resources or unavoidable adverse impacts in relation to the proposed Project. However, the No Action alternative may represent possible impacts to resources on a regional basis because the amount of energy required for the demand would need to be produced from other sources. It would be speculation to say that the demand and subsequent supply would be from other renewable energy sources.

Construction of the proposed Project would require the use of fossil fuels for construction vehicles, equipment, and construction-worker vehicles. Electricity would also be used at construction trailers or by portable generators during Project construction. Wind is a renewable resource that would not be depleted or altered by the action alternatives and could offset the need to consume fossil fuels.

Construction of the proposed Project would require the use of various types of raw building materials, including cement, aggregate, steel, electrical supplies, piping, and other building materials such as metal, stone, sand, and fill material. Additionally, the fabrication and preparation of these construction materials would require labor and natural resources. Utilization of these resources would be irretrievable. However, these resources are readily available at this time, and adverse effects on their continued availability would not be expected.

Inert underground electrical cables and underground concrete turbine pads may be removed or left in place depending on the requirements in the BLM ROW grants. This would represent an irreversible and irretrievable commitment. Construction and operation of the proposed facilities would require labor, which would be otherwise unavailable for other projects. The commitment of labor is considered irretrievable. Due to the current economic downturn in the area, and country as a whole, this commitment of labor, while irretrievable, would not be considered an adverse effect, because the Project would be supplying much needed employment. Furthermore, fiscal resources would be irretrievably committed to construction and operation of the proposed Project. These funds would then not be available for other projects and activities.

In addition to the resources used in construction and operation of the proposed Project, there would be some irreversible and irretrievable loss of existing resources in the impact areas. The loss of productivity (i.e., forage, wildlife habitat) from lands devoted to Project facilities would be an irreversible and irretrievable commitment during the time that those lands are out of production and until they are successfully revegetated. Most of the land would be returned to production after restoration and revegetation; however, the vegetation community may take several growing seasons to fully recover given the arid nature of the landscape. The length of time required for vegetation to recover would vary, depending on the final approved method of reclamation, and any changes that may occur in reclamation processes during the interim or post-construction reclamation, and final reclamation during decommissioning.

Impacts on geological resources could result from surface and subsurface disturbing activities. Both surface and subsurface geology could be damaged (fractured) or destroyed during Project construction activities that disturb bedrock such as coring, trenching, blasting, clearing, and grading. Blasting, coring, and trenching would fracture and permanently alter bedrock resulting in irreversible and irretrievable impacts on geology. The type of and magnitude of bedrock disturbance would be different for each of the Project features, and would be contingent of the location of the individual item.

The Project would use gravel mined from the Detrital Wash, and this use would represent a depletion of the resource, which is irretrievable and irreversible. However, due to the abundance of gravel, and relatively low demand for this resource in the area, this impact would not be considered a substantial loss.

The permanent loss of soil and vegetation within small and highly localized areas that would not be reclaimed would result in irreversible and irretrievable impacts on soils and vegetation.

Surface water, groundwater, and ephemeral washes could be impacted during Project construction activities that disturb soil and bedrock. Blasting, coring, and trenching could increase the potential for sediment erosion and transport by removing stabilizing vegetation and increasing runoff during storm events, and possibly alter the natural flow of water and redirect the flow path of the water resulting in irreversible and irretrievable impacts on hydrology. Each action alternative would have the potential to impact hydrology on all, or portions of areas associated with each Project feature.

Groundwater pumping for Project construction activities would remove up to about 75 acre-feet from storage in the Basin-Fill aquifer of the Detrital Valley. These withdrawals would be irretrievable since they would either be used for consumptive purposes, such as mixing cement, or would be applied for dust control and lost to evapotranspiration. Groundwater losses associated with the Project would be replenished very slowly due to limited natural recharge that occurs mainly in mountain-front areas. However, projected withdrawals represent a very small portion (0.03 percent) of potentially recoverable groundwater in the township where the pumping wells are located. As such, the consequences of this impact on the Detrital Valley Basin-Fill aquifer would be nearly imperceptible, and natural recharge would, over time, replenish the aquifer.

Archaeological sites are by their nature finite, and once damaged or destroyed they cannot be replaced. The loss of such sites is therefore irreversible and irretrievable. Recovering artifacts and information from archaeological sites before they are damaged or destroyed and preserving the recovered artifacts and information commonly is considered acceptable mitigation for the loss of such sites. In contrast, visual impacts on the settings of cultural resources are likely to be long term but not necessarily permanent, and decommissioning the Project and restoring the landscape could reverse visual impacts to the settings of cultural resources.

Although no paleontological localities are known in the Project Area, the absence of records does not indicate the absence of the possibility of their occurrence. Geologic deposits in the area are of a type that could produce paleontological resources. If any are uncovered during construction a monitoring and mitigation program would be developed, but the movement of the artifacts would represent an irreversible and irretrievable impact.

4.18 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). Effects on resources are often characterized with respect to their being of a long or short duration. The impacts and use of resources associated with the proposed Project are described in earlier sections in this chapter and are not repeated in this section. This section discusses the tradeoffs in the relationship between short-term uses of the environment and maintenance and enhancement of long-term productivity of resources, which would not differ appreciably among the action alternatives.

The Project would require commitments of resources as discussed in the previous resource sections, for the life of the Project through the conversion of undeveloped land to a wind energy facility. Impacts during construction would be relatively short term (12 to 18 months) and would be mitigated by BMPs and stipulations, including requirements for reclamation, habitat restoration, and weed management, which would help minimize the impacts on long-term productivity.

The impacts during operations would constitute long-term uses of the environment; however, these uses would not conflict with relevant land use plans administered by BLM and Mohave County, or policies, directives and standards for lands administered by Reclamation. The impacts of short-term use during decommissioning also would be mitigated by required reclamation, weed management, and habitat restoration activities, which would result in making the land suitable for other uses.

The short- and long-term use of the environment from the Project can be compared to the long-term maintenance and enhancement associated with the benefits provided by the Project. Wind energy would provide clean, renewable energy consistent with federal and state goals to increase production of renewable energy to help reduce dependence on fossil fuels.

Impacts on transportation and access and economics would occur primarily during construction and decommissioning; although economic benefits, to a lesser extent, could extend throughout operation of the Project. Boosts to the local economy would be realized through labor, purchase of supplies, and through the needs of workers associated with constructing and decommissioning the Project.

Although the Project would not require a large amount of land to be taken out of production, relative to the amount of undeveloped land in the area (see Section 2.2.2), losses of vegetation, displacement of animals and habitats from natural productivity to accommodate Project infrastructure and temporary disturbances during construction would occur. Constructing the Project would result in short-term and long-term disturbances of biological habitats and could cause long-term reductions in the biological productivity in localized areas near facilities. Long-term impacts on wildlife productivity would equate to impacts on populations. The impacts on mature vegetative communities and associated wildlife habitat would last until the vegetation was reestablished to current conditions.

4.19 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

The BLM encourages the development of wind energy within acceptable areas, consistent with the Energy Policy Act of 2005 and the BLM Energy and Mineral Policy (August 26, 2008).

4.19.1 Energy Analysis

Section 4.17 discusses the irretrievable and irreplaceable energy requirements associated with the proposed Project.

Chapter 1 of this EIS discusses the energy requirements under the National Energy Policy Act which establishes a goal for the Secretary of the Interior to approve 10,000 MW of electricity from non-hydropower renewable energy projects located on public land. Chapter 1 also discusses the energy requirements of BLM and Reclamation under various laws, policies and orders. Additionally, Arizona, Nevada and California have all established standards for generation of energy from renewable sources. Based on these requirements, the analysis for energy requirements involves discussing the ability of the Project to contribute to the federal and state goals and standards.

4.19.2 Conservation Potential

For any wind farm project, conservation potential can be discussed in two separate areas. The first conservation potential involves the ability for conservation of non-renewable resources through the use of renewable resources to provide basic energy needs to people. All energy technologies have some negative impact on the natural environment, and the second conservation potential involves the ability of the Project to promote the conservation of species that may be impacted by the Project.

The Project would be considered a contributor toward reaching the federal and state goals and standards for meeting energy requirements. BP Wind Energy has applied to generate at least 425 MW, and up to 500 MW of power at the proposed Mohave County Wind Farm Project and has filed interconnection agreements with Western that commit the firm to this generation capacity if the Project is approved (see Section 2). The substitution of fossil fuels with the increasing use of renewable energy sources is fundamental to reducing emissions of greenhouse gases.

The production of either 425 MW or 500 MW would represent a direct conservation potential because the energy produced would not consume non-renewable resources.

5.0 CONSULTATION AND COORDINATION

5.1 HISTORY OF PUBLIC INVOLVEMENT

This Environmental Impact Statement (EIS) represents the efforts and involvement of a broad range of participants, including public agencies, tribal councils, private organizations, and individuals. The lead agency, the Bureau of Land Management (BLM) Kingman Field Office (KFO), met and consulted with various federal, state, county, tribal, and local agencies throughout the process. Interested parties were invited into the process through various formal and informal methods, including meetings with public agencies, tribes, interest groups, and individuals; scoping meetings; letters of invitation; e-mail correspondence; BLM website; and distribution of postcards and newsletters. This section summarizes those activities.

5.1.1 Summary of Scoping Meetings, Issues and Comments

Scoping, the first step in the EIS process, was conducted from November 20, 2009 through January 8, 2010. The scoping period was initiated with the publication of the Notice of Intent (NOI) in the Federal Register on November 20, 2009. Three public meetings and an agency meeting were held during the 45-day scoping period in Kingman, Dolan Springs, and White Hills, Arizona.

During initial scoping, 71 comment submissions were received and entered into a comment database. Within the 71 comment submissions, 398 issues were identified and categorized into 15 main categories of issues and 41 categories of sub-issues, allowing the Project team to identify areas of concern and quantify issues on both broad and detailed levels.

Based on additional studies, refinement of the preliminary Project description, and comments received during initial scoping, the Wind Farm Site was revised to include land managed by the Bureau of Reclamation (Reclamation) while eliminating some Federal and private land previously identified as the subsequent phases of the Project. In addition, a potential opportunity to interconnect with the Moenkopi-El Dorado transmission line located about six miles south of the Wind Farm Site was identified, which if considered would require the construction of a new transmission line on public and private lands. Because these changes to the Project occurred after conclusion of the initial scoping period on January 8, 2010, and development was proposed on land administered by an additional Federal agency, a supplemental scoping period was established to allow stakeholders the opportunity to review updated Project information and identify additional comments or issues for consideration in the EIS.

The supplemental scoping period for the Project was initiated with publication of a NOI on July 26, 2010 in the Federal Register and concluded on September 9, 2010. Four public scoping meetings were held during the supplemental scoping period, with one at each of the three initial scoping meeting communities and an additional meeting in Peach Springs, Arizona. Public comments received during the supplemental scoping period also were entered into the database; 20 comment submissions were received after the first scoping period but before the supplemental scoping period (January 8 through July 25, 2010), and an additional 22 comment submissions were received during the formal supplemental scoping period (July 26, 2010 through September 9, 2010). Within these 42 comment submissions, 76 issues were identified.

In total, 113 comment submissions were received, in which 474 issues were identified and categorized into the main categories and sub-issues. BLM considered all input received after January 8, 2010, the official close of the first scoping period, through and including the comments received during the supplemental scoping period.

Two broad categories of comments were identified, Actions and Alternatives, and Environmental Impacts. The Actions and Alternatives category included comments about various aspects and components of the proposed Project, as well as suggestions for and concerns about alternative facilities or decisions that people felt should be considered in the EIS. Comments in this category also identified topics relative to the planning and EIS preparation process, including public review opportunities. The Environmental Impacts category included comments about the proposed Project's potential impacts on natural, human, and cultural resources, and identified the social and economic concerns that people felt should be addressed in the EIS. The comments from these two broad categories were further categorized in 15 main issue categories. Table 5-1 summarizes the volume of comments received on each of the 15 main issue categories.

Table 5-1 Percent of Comments by Issue

Main Issue	Percent of Total Issues Identified – All Comments Received
Project Description	17.3
Project Need	3.4
Project Alternatives	5.3
National Environmental Policy Act (NEPA) Process	7.0
Air Quality	2.7
Biological Resources	23.0
Cultural Resources	2.3
Cumulative Effects	4.2
Geology and Minerals	3.3
Hazardous Materials and Safety	1.3
Land Use, Recreation, and Transportation	8.0
Noise	4.2
Socioeconomics	9.3
Visual Resources	5.7
Water Resources	3.0
Total	**100.0**

A more detailed discussion of the scoping process, including a summary of public comments and issues identified in both the initial and supplemental scoping periods, is documented in the Scoping Summary Report dated March 2010 and the Supplemental Scoping Report dated November 2010. Both reports are available on the BLM website, www.blm.gov/az/st/en/prog/energy/wind/mohave.html.

5.1.2 Federal, Tribe, State, Local Government Agencies and Organizations Consulted

Agency and tribal coordination is an important step in a successful collaborative process for several reasons. First, early involvement with other federal and state agencies and tribal and local governments establishes a solid working relationship with each agency. It builds trust and credibility between agencies in support of the analysis in the EIS. Finally, it helps ensure that BLM decisions are supported by other agencies and conform to applicable regulatory requirements.

Interested agency and interested party letters were distributed at the beginning of scoping to Tribes, agencies, and stakeholder groups to introduce the Project and solicit their participation in the scoping process. Interested agency letters also included an invitation to a separate agency meeting. The following is a distribution list for the letters.

<u>FEDERAL</u>

U.S. Department of Agriculture

- Natural Resources Conservation Service, Arizona State Office
- Natural Resources Conservation Service, Kingman Field Office

U.S. Department of Defense

- Air Force Region 9 Environmental Office
- Luke Air Force Base
- Office of the Deputy Under Secretary of Defense (Installations and Environment)
- Region IX, Navy Region Southwest Environmental Department
- U.S. Air Force, Environmental Division, Chief
- U.S. Air Force, Office of Deputy A/S of USAF, Environment, Safety, Occupational Health
- U.S. Army Corps of Engineers
  - Los Angeles District Office
  - South Pacific Division, Los Angeles District, Arizona/Nevada Area Office

U.S. Department of Energy

- Division of NEPA Affairs
- National Renewable Energy Laboratory
- Office of Environmental Policy and Compliance (EH-23)
- Western Area Power Administration

U.S. Department of Interior

- Bureau of Indian Affairs
  - National Office
  - Western Area Regional Office, Environment Quality Services
- Bureau of Reclamation
  - Deputy Commissioner
  - Lower Colorado Dams Office
  - Lower Colorado Regional Office
- National Park Service
  - Lake Mead National Recreation Area
  - Air Resources Division
  - Grand Canyon National Park
  - Natural Sounds Program
  - NEPA/Section 106 Specialist
- Natural Resources Library
- Office of Environmental Policy & Compliance
- Office of Surface Mining, Reclamation and Enforcement
  - Minerals Management Service, Environmental Division
  - Office of Surface Mining
- U.S. Fish and Wildlife Service
  - Division of Environmental Quality
  - Fish and Wildlife Service, Chief, Division of Federal Projects
  - Flagstaff Office
- U.S. Geological Survey
  - Flagstaff
  - National Office

U.S. Department of Transportation

- U.S. Federal Aviation Administration
  - National Headquarters Office, Obstruction Evaluation Service
  - Western U.S. Operations
  - Western-Pacific Region
- U.S. Federal Communication Commission

U.S. Environmental Protection Agency

- Office of Federal Activities, EIS Filing Section
- Region 9 – Environmental Review Office

Library of Congress

TRIBES

Chemehuevi Tribal Council
- Chairman
- Cultural Resource Director

Colorado River Indian Tribes
- Chairman
- Museum Director

Fort Mojave Tribal Council
- Chairman
- Director, Aha Makav Cultural Society

Havasupai Tribe
- Chairwoman
- Natural Resources Department

Hopi Tribe
- Chairman
- Director Cultural Preservation

Hualapai Tribe
- Chairman
- Tribal Historic Preservation Officer

Kaibab Paiute Tribal Council
- Chairwoman

Las Vegas Paiute Tribe
- Chairperson
- Cultural Resources Coordinator

Moapa Band of Paiute Indians
- Chair, Cultural Committee
- Environmental Committee

Pahrump Paiute Tribe

San Juan Southern Paiute Tribe
- President

Yavapai-Apache Nation
- Chairman
- Tribal Archaeologist

Yavapai-Prescott Indian Tribe
- President
- Director, Cultural Resources

STATE OF ARIZONA

Corporation Commission

Department of Environmental Quality
- Phoenix Main Office
- Water Resources Division

Department of Revenue

Department of Transportation
- Kingman District Office
- Permitting Department
- State Engineer's Office

Game and Fish Department

Governor's Office

State Geological Survey

State Historic Preservation Office

State Land Department

State Parks Department

MOHAVE COUNTY

Board of Supervisors

County Manager's Office

Development Services Department

Economic Development Department

LOCAL

City of Kingman
- Mayor
- Airport Authority
- City Manager
- Community Development

Boulder City
- Mayor
- City Manager

Bullhead City
- Mayor

Lake Havasu City
- City Manager

OTHER STAKEHOLDER GROUPS

Arizona Antelope Association

Arizona Chapter of the Wildlife Society

Arizona Desert Bighorn Sheep Society

Arizona Mule Deer Society

Arizona Riparian Council

Arizona Sportsman

Arizona Wildlife Federation

Arizona Wildlife Outfitters

Audubon Society, Arizona Chapter

Bullhead 4 Wheelers

Center for Biological Diversity

Cerbat Ridge Runners

Defenders of Wildlife

Desert Bighorn Council

Dolan Springs Chamber of Commerce

Friends of Grand Canyon

Grand Canyon Wildlands Council

Kingman Area Chamber of Commerce

Mohave Sportsman's Club

Northwest Arizona Watershed Council

Public Lands Advocacy

Sierra Club

The Grand Canyon Trust

The Nature Conservancy

The Peregrine Fund

The Sonoran Institute

Walapai 4 Wheelers

Western Resource Advocates

Western Watersheds Projects

Wild Earth Guardians

5.2 CONSULTATION AND COORDINATION WITH GOVERNMENTS AND AGENCIES

BLM is required by law to prepare NEPA analysis and documentation in cooperation with any other Federal agency which has jurisdiction by law (40 CFR 1501.6). Additionally, qualified Federal agencies, tribes, or other governments can enter into formal cooperation under this provision and are called cooperating agencies.

5.2.1 Cooperating Agencies

Cooperating agency letters of invitation were sent at the initiation of scoping to those agencies and tribal governments identified by the BLM, as having a jurisdiction over the Project or special expertise regarding resources to be analyzed in the EIS. Cooperating agencies are allowed opportunities for participation through interagency meetings and active engagement in the preparation of the EIS, in addition to other opportunities throughout the NEPA public participation process. Specific roles of the lead and cooperating agencies, as well as coordination opportunities and the issue resolution process, are defined in individual Memorandums of Understanding entered into between BLM and each cooperating agency for the Project.

In response to BLM's invitation, six entities agreed to serve in the formal role as a cooperating agency, including Reclamation, Western Area Power Administration (Western), National Park Service (NPS), Arizona Game and Fish Department (AGFD), Mohave County, and the Hualapai Tribe. Several of the invited entities declined to serve in the capacity of a cooperating agency, but indicated an interest in being informed about the Project. BLM has continued to communicate and collaborate with these agencies and tribes throughout the process through meetings, conference calls, newsletters, the BLM website, and/or other consultation.

5.2.2 Formal Consultation

5.2.2.1 Biological Resources

The requirement for consultation with the U.S. Fish and Wildlife Service (USFWS) prior to initiation of a federal action (project) that may affect any federally listed species or its habitat are identified in 50 CFR Part 402. The Mohave County Wind Farm Project is considered a Federal action and, in accordance with Section 7 of the Endangered Species Act, early coordination with USFWS was initiated. On December 12, 2011, the USFWS provided an evaluation of federally listed threatened or endangered species known to occur in Mohave County and the potential to be affected by the Project. In this evaluation, the USFWS agreed with the BLM's initial determination that no federally listed threatened or endangered species, and/or critical habitat would be affected by the Project with the rationale that they currently do not occur in the area (Section 4.5). The USFWS identified concerns about potential impacts to the non-essential population of California condor and the candidate Sonoran population of desert tortoise.

Additionally, the USFWS was contacted on December 16, 2010 about the potential for California condors to utilize the Project Area. On the same date, the USFWS provided information through the Peregrine Fund that California condors have been moving their use away from the Project Area for about a decade.

The BLM contacted the USFWS concerning the Project impacts on the golden eagle in accordance with the Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d), and BLM Instruction Memorandum 2010-156. Formal coordination activities have occurred, and BP Wind Energy retained a consultant to prepare an Eagle Conservation Plan (ECP) as part of a Bird Conservation Strategy (BCS) which was identified as a requirement for the Project in 2011. BP Wind Energy has worked closely with USFWS, AGFD, BLM, and Reclamation to develop the ECP/BCS that is consistent with the 2011 Draft ECP Guidance from USFWS (USFWS 2011a). Since the initial contact with agencies in 2008 and as part of BP Wind Energy's consultation with USFWS concerning the preparation of the ECP/BCS, BP Wind Energy has held seven in-person meetings and 19 conference calls with the agencies, as well as communication via email or telephone with agency experts concerning the preparation and requirements for the ECP/BCS. The full chronology of the coordination is included in Table 1 of the ECP/BCS, which will be included as an attachment to the Department of the Interior Record of Decision (ROD) for the Project. The potential impacts to the golden eagle with Alternative E, the Agencies' Preferred Alternative, which was developed in consultation with the USFWS, are discussed in detail in Section 4.5.6.

A cooperative agreement was entered into with AGFD (Memorandum of Understanding AZ-2010-05) and this agency has participated in review of the Project and the development of this EIS to provide its special expertise and knowledge regarding biological resource issues.

5.2.2.2 Archaeological and Historic Resources

In conjunction with preparing the EIS, BLM also is serving as the lead Federal agency in considering effects of the Project on properties listed in or eligible for the National Register of Historic Places (National Register), pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. 470 et seq.) and implementing regulations and policies. BLM has been consulting with the cultural resource specialists of cooperating agencies, including Western, Reclamation, and NPS, as well as the Arizona State Historic Preservation Officer (SHPO) and interested tribes.

On March 29, 2010, BLM formally initiated consultations with SHPO by sending a letter providing information about the Project and copies of the cultural resources overview and survey plan that had been prepared for the Project. SHPO provided comments by letter dated April 30, 2010. BLM revised the cultural resource survey plan to address SHPO's suggestions regarding the evaluation of historic roads. BLM held tours for interested agencies and tribes in March 2010 and April 2011. In January 2012, BLM provided copies of all the cultural resource reports prepared for the Project to SHPO, other agencies, and tribes, and consulted about determinations of National Register eligibility and the effect of the Project on National Register-eligible properties. The Arizona SHPO concurred with BLM's determinations of National Register eligibility and finding of adverse effect by letter dated March 1, 2012. In April 2012, copies of the draft EIS were distributed to SHPO and agencies.

Because one or more National Register-eligible properties could be disturbed by construction of the wind farm, BLM developed, in consultation with SHPO, Reclamation, Western, NPS, interested Indian tribes, and BP Wind Energy, a Section 106 Memorandum of Agreement (MOA) (Appendix G). In April 2012, BLM formally notified the Advisory Council on Historic Preservation that BLM had made a determination of adverse effect and invited the Council to participate in the MOA, but the Council notified BLM by letter dated May 7, 2012, that they concluded that the Council's participation was not needed to resolve the adverse effect. In July 2012, BLM sent a draft MOA to the agencies and tribes, and hosted a meeting on August 15, 2012 at the BLM KFO to review the draft MOA. Representatives of Reclamation, Western, and NPS participated in the meeting. SHPO provided comments on the draft MOA in a letter dated August 17, 2012. The BLM revised the draft MOA based on comments from the tribes, SHPO, and other consulting parties and distributed a revised agreement for review and comment in October 2012.

The MOA stipulates that a Historic Properties Treatment Plan (HPTP) be prepared and implemented to address adverse impacts on properties eligible for the National Register. The HPTP would be completed after final design of the Project identifies which historic properties cannot be avoided. Final design will be initiated if and when a ROD is issued, authorizing development of an action alternative. The HPTP will include measures to address indirect visual impacts on traditional Hualapai cultural resources. In response to suggestions from the Hualapai Tribe, those measures will include developing educational programs, curriculum materials, or public outreach to preserve information about the traditional cultural importance of the area for the Hualapai Tribe and to reinforce continued cultural connections to the area. Except for safety reasons during construction, the project is not expected to restrict access for traditional religious purposes or resource collection by tribes. The HPTP would be the major component of a Cultural Resource Management Plan (CRMP) that is being prepared in accordance with recommendations of the BLM *Programmatic Environmental Impact Statement on Wind Energy.* The CRMP would include procedures for complying with laws other than Section 106, such as the Native American Graves Protection and Repatriation Act, and perhaps measures to mitigate impacts on other elements of the cultural environment that are not historic properties. Section 4.6.7 provides additional information about the HPTP and CRMP. The BLM will continue to consult with the involved agencies throughout the EIS process and during post-EIS development of any action alternative in accordance with the MOA.

5.2.2.3 Tribal Consultation

The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders (EOs), and court decisions. The BLM has a responsibility to consider and consult on potential effects to natural resources related to tribal treaty rights or cultural use. In recognition of this relationship, BLM consults with tribal governments on a government-to-government basis pursuant to NEPA; Section 106 of the National Historic Preservation Act (NHPA); EO 13175; and other laws, EOs, and policies in accordance with BLM Manual 8120, *Tribal Consultation under Cultural Resources*. Although such consultations typically focus on Section 106 compliance and matters related to cultural resources, tribes are invited to comment on other issues of concern to their communities or governments.

On September 14, 2009, the BLM KFO initiated government-to-government consultation with federally recognized Indian tribes that have traditional cultural ties or interests in the area of the proposed Mohave County Wind Farm by sending certified letters to elected leaders of the following federally recognized tribes:

- Hualapai Tribe
- Fort Mojave Indian Tribe
- Colorado River Indian Tribes
- Las Vegas Paiute Tribe
- Moapa Band of Paiutes
- Havasupai Tribe
- Chemehuevi Tribe
- Hopi Tribe
- Yavapai-Prescott Indian Tribe
- Kaibab Band of Paiute Indians
- San Juan Southern Paiute Tribe
- Yavapai-Apache Nation

The letters described the proposed Project and invited the tribes to participate as formal cooperating agencies for preparation of the EIS. BLM also invited the Pahrump Paiute Tribe, which is not federally recognized; however, the tribe did not respond to indicate it had an interest in the proposed Project.

On November 20, 2009, BLM initiated formal Section 106 consultation by sending certified letters to elected tribal officials, with copies to the lead staff of tribal cultural resource departments. The tribes were invited to attend a coordination meeting and field tour on January 12, 2010. BLM staff followed up with contacts to tribal staff by telephone and electronic mail. In December 2009, BLM postponed the planned meeting because of a conflict with a tribal listening session that the Department of the Interior scheduled in Phoenix. In February 2010, after coordinating with tribal staff to select a new date, BLM sent letters rescheduling the meeting for March 16, 2010 and provided the tribes with copies of the Cultural Resources Class I Overview prepared for the Project and requested their review and comment. The Hualapai Tribe provided comments on the ethnographic background section of the document and shared information about traditional Hualapai perspectives on the White Hills and Senator Mountain, which has been incorporated in this EIS.

Representatives of the Hualapai, Las Vegas Paiute, and Yavapai Prescott tribes attended the meeting on March 16, 2010 at the KFO, followed by a tour of the proposed Project Area. The KFO Manager attended the meeting and tour. The director of the Aha Makav Cultural Society, affiliated with the Fort Mojave Tribe, planned to attend but was unable to do so. The KFO Archaeologist met with her the next day at her office to share information about the Project and to offer a separate tour. The Hopi Tribe responded to the invitation indicating they would be unable to attend the meeting but wished to continue to receive copies of cultural resource reports for review and comment.

During the March 2010 field tour, Hualapai Tribe staff identified several topographic features in the Project Area and surrounding areas (some with Hualapai place names) as areas of traditional cultural concern that could be subject to visual effects from the proposed wind farm. These locations were subsequently incorporated into the visual impact analysis for the EIS and, during the spring of 2010, tribal staff participated in field visits to those places to take photographs for the visual analysis. During the spring of 2010, the Hualapai Tribe also signed a Memorandum of Understanding to serve as a cooperating agency and provide special expertise for preparation of the EIS. In addition to participating in the preparation and review of the EIS, staff of the tribe's Department of Cultural Resources participated in the review of cultural resource reports and served as crewmembers for cultural resource surveys for the Project.

In the summer of 2010, the boundaries of the proposed Project were revised to eliminate the eastern portion in the White Hills and add lands to the west that are administered by the Reclamation. On August 27, 2010, an EIS public scoping meeting for the modified Project was held at the Hualapai Tribe Cultural Center in Peach Springs. Visual simulations from key observation points identified by the tribe were available at the meeting for inspection and comment. Three members of the Tribal Council attended the meeting, as did the KFO Manager.

On October 26, 2010, BLM sent letters to the tribes to update them on the revised Project boundaries and to share a summary of the preliminary results of cultural resource surveys. The letters invited the tribes to participate in a field tour of the sites, and to continue participating in Section 106 consultations. The BLM also offered to meet with the tribes to discuss any concerns they might have. The Compliance Officer of the Yavapai-Prescott Indian Tribe and the Director of the Hopi Cultural Preservation Office responded with letters acknowledging receipt of the information and requested continued involvement.

On March 8, 2011, BLM sent letters inviting the tribes to attend a consultation meeting and field tour of the Project Area on April 19, 2011. The Project applicant and URS, the cultural resource consultant, provided assistance with the meeting and tour, which was attended by eight cultural committee members or staff from the Hualapai Tribe, Fort Mojave Tribe, and Colorado River Indian Tribes. The Moapa Band of Paiutes planned to attend but had to cancel on the prior day. The KFO Manager attended the tour and BLM followed up by email and distributed copies of the meeting notes to the tribes. BLM offered to arrange for a future tour for the Moapa Band of Paiutes and other tribes that did not attend the meeting; there were no requests for another meeting or field visit at that time.

On March 21, 2011, the Hopi Tribe sent a letter expressing concern about potential impacts on bald eagles and other birds. On May 11, 2011, BLM provided reports of wildlife studies conducted for the EIS and offered to arrange for a meeting to discuss the Hopi concerns; the Hopi Tribe did not request a meeting.

On July 12, 2011, BLM distributed copies of the draft cultural resource survey report to the tribes and requested their review and comments on the report and evaluations of the eligibility of the recorded cultural resources (which include nine prehistoric sites) for the National Register of Historic Places (National Register). The letter also informed the tribes of an expansion of the proposed Project boundaries that required supplemental cultural resource survey. In January 2012, BLM distributed to the tribes a report of the supplemental survey along with final reports for the seven other cultural resource studies completed for the Project, and requested comments on evaluations of eligibility for the National Register and a determination of effect. The Hopi Tribe responded in February 2012, indicating that they had reviewed the cultural resource report and deferred participation in the Section 106 MOA to the Hualapai Tribe, but requested continued consultation.

Copies of the draft EIS were distributed to the consulted tribes in April 2012, and on May 14, 2012, a public meeting to receive comments on the draft EIS was held at the Hualapai Tribe Cultural Center in Peach Springs. Several tribal members, including members of the tribal council and tribal government staff, attended the meeting. In July 2012, a draft Section 106 MOA was sent to the consulting tribes and agencies. Follow-up contacts by telephone and email were made to each of the tribes to confirm that they had received the draft MOA and to encourage them to attend a meeting to discuss the draft MOA at the BLM KFO on August 15, 2012. Representatives of the Hualapai Tribe, Fort Mojave Indian Tribe, Colorado River Indian Tribes, and Yavapai Prescott Tribe attended the meeting. The BLM revised the MOA based on comments from the tribes, SHPO, and other consulting parties. A copy of the signed MOA is provided in this Final EIS as Appendix G.

As a result of consultations, Indian tribes identified concerns about direct and indirect impacts to archaeological and ancestral sites; visual effects to places of traditional cultural or religious importance; disruption to spiritual values associated with landscape features; and the cumulative effects of energy projects on traditional territories that are of cultural importance for a range of environmental and heritage values. At the suggestion of the Hualapai Tribe, indirect impacts would be addressed by preserving information about the traditional cultural importance of the area for the Hualapai Tribe and reinforcing continued cultural connections to the area through development of educational programs, curriculum materials, or public outreach. All the prehistoric sites documented during the surveys, which the Hualapai and other tribes regard as ancestral, were determined to be eligible for the National Register under Criterion D for their informational value (see Section 3.6.1.1), and any direct impacts would be mitigated by recovery and preservation of artifacts and information before the sites are disturbed. The Hualapai Tribe suggested that the prehistoric sites might also be eligible under Criterion A (see Section 3.6.1.1); BLM will consider any information the tribes provide identifying associations with events that have made a significant contribution to the broad patterns of tribal history. BLM will continue to consult with tribes about their concerns as the HPTP and CRMP are prepared and implemented during post-EIS development of any action alternative approved by the ROD (as discussed in Sections 4.6.6 and 5.2.2.2).

5.3 PUBLIC PARTICIPATION – SCOPING

A variety of means of disseminating information have been employed throughout the public participation process, including publication of notices in the Federal Register, posting on the BLM website, informational newsletters, news releases, and fact sheets. Each of these is briefly described below.

5.3.1 Notice of Intent

The public was first notified of the Mohave County Wind Farm Project and upcoming scoping meetings through a legal notification, and the NOI, which was published in the Federal Register on November 20, 2009. The NOI announced the intent to prepare an EIS, and advised that specific dates, locations, and times of scoping meetings would be announced through the local media and on the BLM website. In addition, the NOI provided Project information including a description of proposed facilities and Project location, information on how to submit comments and why they are important, and BLM contact information.

The public was notified of the supplemental scoping process and scoping meetings through a NOI published in the Federal Register on July 26, 2010. The NOI described the proposed changes to the Project Area, advised that scoping meetings would be announced through the local media and on the BLM website, and provided information on how to submit comments.

Both NOIs were used to inform the public that the NEPA commenting process was also being used to help satisfy the public involvement process for Section 106 of the NHPA and invited Tribes to participate in the scoping process and as a cooperating agency.

5.3.2 Newspaper and Media Announcements

The public was notified of the initial scoping meetings through a press release distributed on November 23, 2009, to newspapers and local and regional news outlets.

The public was notified of the supplemental scoping meetings through a second press release distributed on August 5, 2010, to newspapers and other news outlets in the vicinity of the Project Area and regionally. Both press releases were sent to county and municipal staff, elected officials, and Arizona congressional members.

5.3.3 Additional Public Notice

The public and many agencies were notified of the initial scoping period and public scoping meetings through a newsletter distributed to approximately 1,900 people in November 2009. The newsletter mailing list, which was updated throughout the Project, included persons with a prior interest in projects within the region, property owners to within 3 miles of the Project Area boundary, local officials including municipal and county staff, Federal and State agencies, potentially interested American Indian tribes, BLM right-of-way holders, mining claimants, other permittees, and other interested parties. Information on how to contact BLM or provide scoping comments was provided in the newsletter.

In addition to the newsletter, an "interested party" letter was sent directly to elected officials, public facilities, and special interest groups (see Section 5.1.2). The letter included a description of the Project, copy of the NOI, a project map, and information on how to provide scoping comments.

A second newsletter detailing the Project progress was mailed to persons on the mailing list in April 2010. Newsletter 2 outlined the results of the initial scoping meetings and the progress of the data collection and alternatives identification.

The public and agencies were notified of the supplemental scoping period and public scoping meetings through a postcard distributed to nearly 2,300 parties on the expanded mailing list on August 12, 2010. The mailing list for the supplemental scoping period was expanded based on requests received through the first scoping period and the inclusion of property owners within 3 miles of the revised Project boundary. The postcard noted that changes had been made to the Project since the initial scoping meetings that were held in December 2009, provided scoping meeting information, and encouraged the public to attend meetings and submit comments by September 9, 2010.

A poster announcing each of the public meetings was distributed by mail to the Dolan Springs Community Center, White Hills Community Association, and Rosie's Den in White Hills, Arizona prior to both the initial and the supplemental scoping meetings. Also, an electronic version of each meeting announcement poster was sent by e-mail to the Kingman Chamber of Commerce with a request to share the information with its members. The purpose of the poster was to increase public awareness of the scoping meetings.

A second postcard notification was sent to the Project mailing list on August 26, 2011. This postcard provided a brief update on the Project, including changes to the Project Area boundary, alternatives being considered, and progress of the EIS.

A BLM website (www.blm.gov/az/st/en/prog/energy/wind/mohave.html) was established early in the Project to provide updates. The supplemental scoping period and scoping meeting dates were announced on the BLM website. While the BLM website is periodically updated, Project information on the website has included the NOI, public meeting information, Scoping Summary Report, Supplemental Scoping Report, Project newsletters, and frequently asked questions.

5.3.4 Public Scoping Meetings

As mentioned in Section 5.1.1, three public scoping meetings were held for the initial scoping period and four meetings were held during the supplemental public scoping period. Locations, dates and attendance of each public meeting are shown in Table 5-2.

Table 5-2 Public Scoping Meeting Attendance

Location	Initial Scoping		Supplemental Scoping	
	Date	Attendance	Date	Attendance
Dolan Springs, Arizona Dolan Springs Community Center	December 8, 2009	21	August 26, 2010	15
Kingman, Arizona Hampton Inn	December 9, 2009	37	August 24, 2010	25
White Hills, Arizona White Hills Community Center	December 10, 2009	52	August 25, 2010	28
Peach Springs, Arizona Hualapai Cultural Center	–	–	August 27, 2010	15
Total attendance at scoping meetings		**110**		**83**

The scoping meetings for both the initial and supplemental scoping periods were held in an open house format. In addition, a brief formal presentation on the proposed Project and NEPA process was made at the initial scoping meetings. Attendees were given a handout of Frequently Asked Questions and a comment form. Display boards used at the scoping meetings presented information on the Project purpose and need, Project description, planning process, purpose of the scoping process, construction process, preliminary noise analysis results, and visual simulations. The open house format allowed attendees to browse the information on the boards and speak informally to Project team representatives.

5.4 PUBLIC REVIEW OF THE DRAFT EIS

Similar to the public scoping process, a variety of means of disseminating information was employed throughout the review of the Draft EIS, including publication of notices in the Federal Register, posting of the Draft EIS on the BLM website, informational newsletters, news releases, and public meetings to solicit comments. Each of these is briefly described below.

5.4.1 Notice of Availability

The Notice of Availability (NOA) for the Draft EIS was published in the Federal Register on April 27, 2012, and advertised in local media. Public comments were accepted during a 45-day review period that began with the publication of the NOA and continued through June 11, 2012. Public meetings to share Project information and receive comments on the Draft EIS were also advertised in local media announcements and announced on the project web page of the Arizona BLM web site.

5.4.2 Newspaper and Media Announcements

A press release to announce the release of the Draft EIS and subsequent 45-day comment period was distributed on April 27, 2012 to newspapers and other news outlets in the vicinity of the Project Area and regionally. The press release was also sent to county and municipal staff, elected officials, and Arizona congressional members.

5.4.3 Additional Public Notice

The public and many agencies were provided advanced notification of the upcoming availability of the Draft EIS via a postcard mailed to approximately 1066 people on April 12, 2012. The postcard was mailed to inform individuals on the mailing list that the Draft EIS would be available to download from the BLM Project website and that hard copies of the Draft EIS would be available at the BLM Arizona State Office and Kingman Field Office as well as libraries in Boulder City, Dolan Springs, Kingman, and Peach Springs. The postcard also provided a return mail form for members of the public to request a compact disk (CD) copy of the Draft EIS.

A newsletter (Newsletter #3) was distributed on April 25, 2012 to the same people who were sent the postcard. Newsletter #3 was also mailed to local officials including municipal and county staff, Federal and State agencies, potentially interested Indian tribes, BLM right-of-way holders, mining claimants, other permittees, and other interested parties. The newsletter provided information on the NOA publication, public meeting locations and time, and information on how to provide comments or contact the BLM. In addition, a brief update on the Project site, the proposed alternatives, and an overview of impact assessment and analysis was included.

The postcard and newsletter provided the BLM Project website address. The Draft EIS was posted in the BLM's Project website at www.blm.gov/az/st/en/prog/energy/wind/mohave.html; the website included instructions on how to provide comments, and the dates and locations of the public meetings.

A poster announcing each of the public meetings was distributed by mail to the Dolan Springs Community Center, White Hills Community Center, and the Hualapai Cultural Center in Peach Springs, Arizona prior to the public meetings. The purpose of the poster was to increase public awareness of the public meetings.

5.4.4 Public Meetings

Four public meetings were held during the Draft EIS public comment period. Locations, dates and attendance by the public for each meeting are shown in Table 5-3. Personnel representing the Mohave County Wind Farm Core Team were also in attendance, but are not counted in the total shown in Table 5-3.

Table 5-3 Draft EIS Public Meeting Attendance

Location	Date	Attendance
Peach Springs, Arizona Hualapai Cultural Center	May 14, 2012	23
Kingman, Arizona Hampton Inn	May 15, 2012	18
White Hills, Arizona White Hills Community Center	May 16, 2012	25
Dolan Springs, Arizona Dolan Springs Community Center	May 17, 2012	17
Total attendance at the public meetings		**83**

The public meetings for the Draft EIS were held in an open house format. A brief formal presentation on the purpose of the meeting (to solicit comments on the Draft EIS), the NEPA process, proposed alternatives and changes to the alternatives since the scoping meetings, and the findings of the impact analysis was made at the beginning of each meeting. Attendees were given a comment form. Copies of the Draft EIS on CD were available for attendees to take with them. The same information was shared at each location.

Following the formal presentation, attendees were invited to review the display boards that were placed around the meeting room and to ask questions of Project team members who were stationed at each display board. The display boards used at the public meetings presented information on the Project features, Project Area location, typical wind turbine construction process, and visual simulations for Key Observation Points 2, 13, 27, and 169. Display boards also provided maps of the Project Area and turbine corridors for each action alternative, as well as projected noise contours for each alternative. The open house format allowed attendees to browse the information on the boards and speak informally to Project team representatives.

5.4.5 Distribution of the Draft EIS

With the exception of the Pahrump Paiute Tribe, which had asked to be removed from the project mailing list, all of the entities listed in Section 5.1.2, received a copy of the Draft EIS on CD. In addition to the organizations listed in Section 5.1.2, the following organizations were added to the project mailing list, and provided a copy of the Draft EIS on CD. A list of the private citizens who received a copy of the Draft EIS is included in the administrative record for the Project. The Draft EIS was also made available on the BLM Project website and paper copies were provided upon request. The Final EIS will be sent to those who submitted comments on the Draft EIS.

ORGANIZATIONS

Arizona Public Service	Maverick Helicopter Tours
Boulevard Associates LLC	Nevada Pac Mining Company
CLXNW LLC	Tiger Gold Inc.
Colorado River Basin Salinity Control Forum	U.S. Borax Inc.
Hualapai Valley Solar LLC	White Hills Community Association
Joshua Tree LLC	Western States Minerals

5.4.6 Public Comments and Responses on the Draft EIS

According to NEPA, federal agencies are required to identify and formally respond to all substantive public comments. A standardized content analysis process was conducted to analyze the public comments on the Draft EIS. Each comment letter and email message received was read, analyzed and considered by BLM, Reclamation, and Western to ensure that all substantive comments were identified. In performing this analysis, BLM, Reclamation, and Western relied on the Council on Environmental Quality's regulations to determine what constituted a substantive comment. A substantive comment does one or more of the following:

- Questions, with a reasonable basis, the accuracy of the information and/or analysis in the EIS.
- Questions, with a reasonable basis, the adequacy of the information and/or analysis in the EIS.
- Presents reasonable alternatives other than those presented in the Draft EIS that meet the purpose and need of the proposed action and addresses significant issues.
- Questions, with a reasonable basis, the merits of an alternative or alternatives.
- Causes changes in or revisions to the proposed action.
- Questions, with a reasonable basis, the adequacy of the planning process itself.

The BLM's NEPA handbook also identifies types of substantive comments including comments on the adequacy of the analysis; comments that identify new impacts, alternatives, or mitigation measures; and disagreements with significance determinations.

The comments received on the Draft EIS were organized by agency (federal, state, county and local), organization or company, and individuals. Each comment within each letter was assigned a number, and each numbered comment received a response. Appendix H provides copies of the letters and/or emails, with a side-by-side response to the numbered comments. Responses were prepared to address each substantive comment. The Final EIS includes revisions to the Draft EIS resulting from BLM's considerations of the public comments.

5.5 DISTRIBUTION OF THE FINAL EIS

The U.S. Environmental Protection Agency (USEPA) and BLM will publish the Notice of Availability (NOA) for the Final EIS in the Federal Register and BLM will distribute a press release to local media.

The entities listed in Section 5.1.2 and 5.4.5, and persons who commented on the Draft EIS will receive a copy of the Final EIS on CD. Persons and agencies on the mailing list will be notified of the locations where copies of the Final EIS are available and the BLM website address where the document may be accessed electronically. In addition to the Final EIS, an updated Plan of Development, and supplemental plans such as drafts of the Integrated Reclamation Plan, Eagle Conservation Plan/Bird Conservation Strategy, Dust and Emissions Control Plan are available on the website.

5.6 ADMINISTRATIVE REMEDIES

This Final EIS is not a decision document. The publication of the NOA in the Federal Register for this Final EIS initiates a 30-day availability period in accordance with 40 CFR 1506.10(b)(2).

If the Secretary of the U.S. Department of the Interior (DOI) approves the Project, a joint ROD would be prepared following the conclusion of the 30-day availability period. The ROD would include resolution of any comments with merit received on the Final EIS, and would be signed by the Secretary of the DOI to document BLM's and Reclamation's decisions. Western would also prepare and sign a separate ROD for the Project, which is not subject to administrative appeal (see Department of Energy NEPA regulations at 10 CFR 1021, which indicates that a decision may be implemented once the ROD has been signed and availability of the ROD has been made public). If the Secretary of the DOI signs the ROD for the Project, that signature will constitute the final decision of the DOI and, in accordance with the regulations at 43 CFR §§ 4.410(a)(3), is not subject to administrative appeal under departmental regulations at 43 CFR Part 4. The RODs will be posted on the BLM website when they have been issued.

5.7 LIST OF PREPARERS

This EIS was prepared by URS Corporation, a third-party contractor, under the direction of the BLM. Representatives from the cooperating agencies contributed and participated in the NEPA process. Table 5-4 provides the individuals who contributed to the preparation or review of the Final EIS and their area or areas of responsibility.

Table 5-4 List of Preparers and Reviewers

Name	EIS Responsibility	Education
Bureau of Land Management		
Don Applegate	Recreation and Visual Resources	BS, Recreation Resources Management
Eddie Arreola	Renewable Energy Coordination Office Supervisory Project Manager	BS, Engineering AS, Engineering
Mike Blanton	Rangeland Management	
William Boyett	Invasive Weeds	MS, Biology BS, Biology
Dennis Godfrey	Public Affairs	BA, Communications/History
Kevin Grove	Wildlife Resources	BS, Wildlife Conservation Biology
Sherrie Landon	Paleontology	MS, Sedimentology/Paleontology BS, Environmental Geology
Len Marceau	Outdoor Recreation and Visual	BA, Recreation
Dave Maxwell	Air Resources	MS, Air Pollution/Environmental Health MBA, Business Administration MPA, Public Administration BS, Meteorology
John McCarty	Chief Landscape Architect	BS, Landscape Architecture
Paul Misiaszek	Geology and Mining	BS, Geology
Jackie Neckels	Planning and Environmental Coordinator, Arizona Renewable Energy Coordination Office	BA, Journalism and Mass Communications AA, Commercial Art
Craig L. Nicholls	Air Resources	MS, Atmospheric Science BS, Atmospheric Science
Sally Olivieri	GIS Analysis	
John Reid	Access and Transportation	BS, Recreation and Parks Administration
Karla Rogers	Visual Resources Management	
Ruben A. Sanchez	Kingman Field Office Manager	

Name	EIS Responsibility	Education
Connie Stone	Cultural Resources/Archaeology	PhD Anthropology MA, Anthropology BA, Anthropology
Melissa Warren	Lands and Realty	BS, Business Information Systems
Tim Watkins	Cultural Resources	
Bill Wells	Water Resources	MS, Watershed Management BS, Business Administration
Ammon Whilhelm	Wildlife Resources, Visual Analysis	BS, Fish and Wildlife Management
J&J Crockford Consulting		
Jerry Crockford	BLM Third Party – Management Consultant/Project Manager	AA, Business Management AAS, Real Estate Years of Experience: 34
URS Corporation		
Peter Allen	Soils, Geology, and Geologic Hazards	BS, Civil Engineering
Tyler Besch	Transportation	BSP, Urban Planning
Lynn Bowdidge	Project Coordinator, Technical Review/QA/QC, Executive Summary	MS, Environmental Science BA, Communication
Sunny Bush	Public Health and Safety, Public Involvement Task Leader	BA, English BS, Hazardous Materials Management International Association of Public Participation Certification
J.P. Charpentier	Wildlife and Fisheries	MS, Wildlife Ecology BA, Psychology
Robert DeBaca, PhD	Wildlife, Vegetation, Wildland Fire, Invasive Species, Special Status Species, Wildlife Corridors	PhD, MS, BA, Biology BA, Environmental Conservation
Beth Defend	Project Manager	BA, Technical Journalism
Dennis Dudzik, PE	Technical Advisor	BS, Mechanical Engineering
Bob Estes	Climate and Air Quality	BS, Environmental Science
Jennifer Frownfelter	Principal-in-Charge, Land Use Compatibility	MS, Environmental Management MS, Public Policy BS, Environmental, Population, and Organismic Biology
Allison Getty	Lands/Realty, Recreation, Special Designations, Access	MA, Natural Resources BS, Natural Resources and Environmental Management
Peggy Goodrich	Climate and Air Quality	BA, Chemistry
Darla Hareza	Public Involvement Task Leader	Course work in Business Administration/Marketing Int'l Association of Public Participation (IAP2)
Jeff Heyman, PE, RG	Soils, Geology, and Geologic Hazards	BS, Geology, Engineering Geology
Kirsten Johnson	Cultural Resources History	MA, Public History and U.S. History BA, History
Rich Johnson	Microwave Radar/Other Communications	BA, Management
Timothy Johnson, GISP	Project Coordination Website Comment Analysis System	MAS, Geographic Information Systems BS, Environmental Resources
David Konopka	Visual Resources	BS, Natural Resources and Landscape Architecture Grad. Studies, Landscape Architecture

Name	EIS Responsibility	Education
David Lawrence	Visual Resources/Simulations	Coursework in Drafting Design, Music Business, and Production 3ds Max Design 2011, Certified Associate AutoCAD Civil 3D 2011, Certified Associate BLM Visual Resource Management 5-day Course
Peter Martinez	Administrative Record	MA, Geography BS, Geography
Mitch Meek	Graphics	BFA, Graphic Design
Jennifer Pyne, AICP	Water Resources	MEP, Environmental Planning BA, Politics
Meg Quarrie	Technical Editing	BA, Liberal Arts
Patty Renter	GIS Analysis	Visual Basic 2001 Business Administration 1990
Cary Roberts	Deputy Project Manager through Draft EIS Physical/Human Environment Task Leader	MS, Environmental Management BS, Ecology and Evolutionary Biology
A.E. (Gene) Rogge, PhD	Cultural Resources Task Leader Archaeology, Traditional Cultural Resources	PhD, Anthropology MA, Anthropology BA, Anthropology
Matt Spansky	Water Resources	BA, Geology
Joe Stewart, PhD	Paleontology	PhD, Systematics & Ecology MA, Systematics & Ecology BA, Biology
Mark Storm, INCE Bd. Cert.	Noise	BS, Aeronautics & Astronautics
Rachel Wagner	Project Coordination Website Comment Analysis System	BS, Applied Computing
Leslie Watson	Deputy Project Manager for Final EIS	BS, Zoology
Cardno ENTRIX – Subconsultant to URS Corporation		
Rabia Ahmed	Environmental Justice	MS, Economics BS, Economics and Statistics
Barbara Wyse	Socioeconomics	MS, Economics BA, Environmental Sciences and Policy

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Bureau of Reclamation • Western Area Power Administration • National Park Service
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