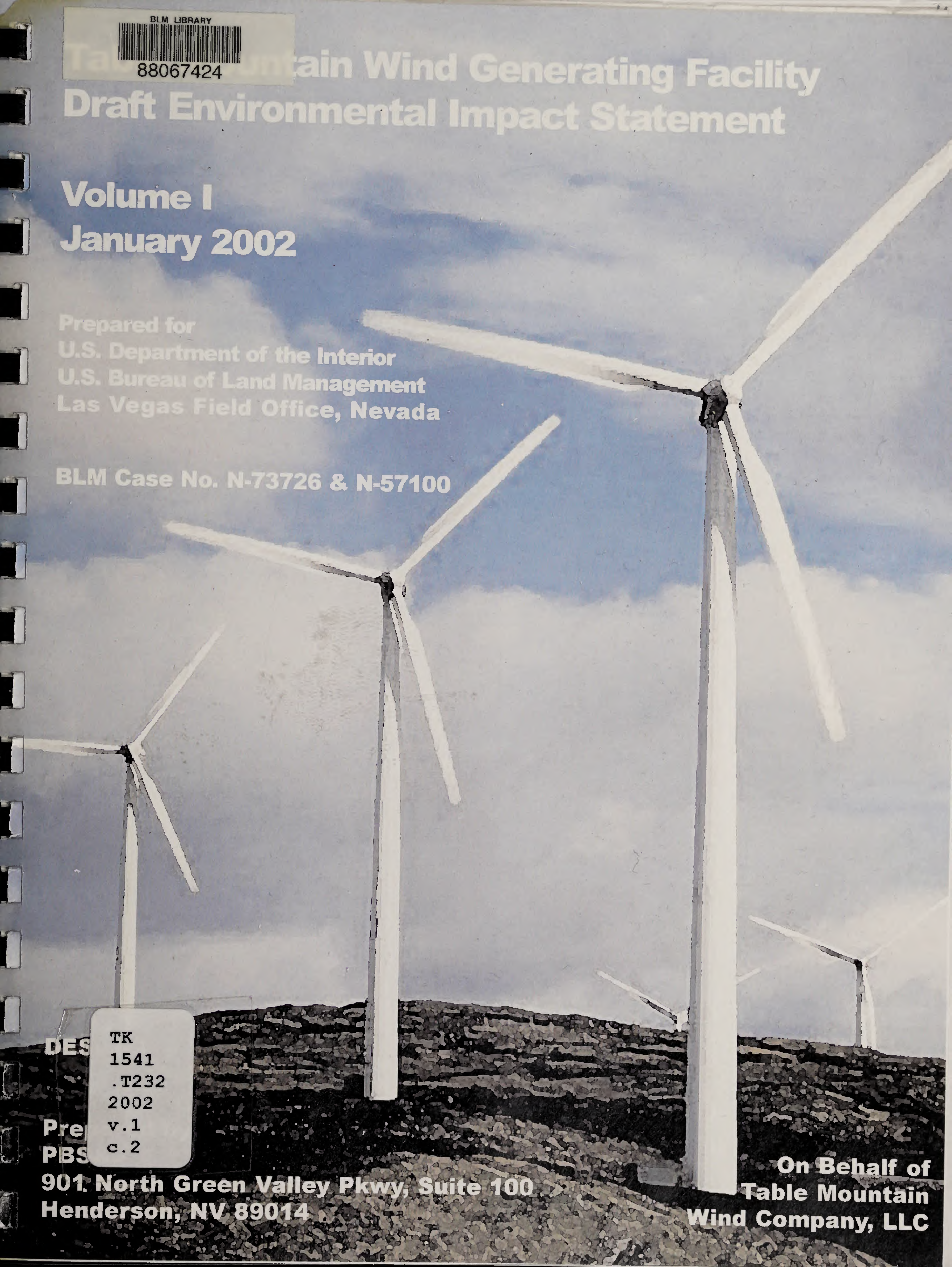
Table Mountain Wind Generating Facility
Draft Environmental Impact Statement

Volume I
January 2002

Prepared for
U.S. Department of the Interior
U.S. Bureau of Land Management
Las Vegas Field Office, Nevada

BLM Case No. N-73726 & N-57100



DES

Pre
PBS
901 North Green Valley Pkwy, Suite 100
Henderson, NV 89014

On Behalf of
Table Mountain
Wind Company, LLC

United States Department of the Interior

Bureau of Land Management
Las Vegas Field Office
4765 W. Vegas Drive
Las Vegas, Nevada, 89108-2135

In Reply Refer To:
NVN66472, etal.
2800 (NV-056)

January 23, 2002

Dear Reader:

Enclosed for your review and comment is the Draft Environmental Impact Statement (DEIS) for the Table Mountain Wind Generating Facility. The proposal consists of proposed arrays of wind turbine generators and ancillary facilities.

Your review and comments are needed to ensure that all concerns will be considered. Written comments on the DEIS must be postmarked or otherwise delivered by 4:30 p.m. 60 days following the date the Environmental Protection Agency (EPA) publishes the Notice of Availability (NOA) and filing of the DEIS in the Federal Register. The EPA NOA is expected to be published on or about February 1, 2002. To ensure prompt review and concideration of your comments, please note on the envelope, "Draft Enironmental Impact Statement Comments Enclosed - Table Mountain Wind Generating Facility." Comments should be mailed to the Bureau of Land Management, Jerry Crockford, Project Manager, Las Vegas Field Office, 4701 N. Torrey Pines Drive, Las Vegas, NV 89130-2301.

Public meetings will be held at the following locations to take oral comments:

- Tuesday, February 26, 2002 @ Community Center, West Quartz Avenue, Sandy Valley, NV
- Wednesday, February 27, 2002 @ Community Center, 375 West San Pedro Avenue, Goodsprings, NV
- Thursday, February 28, 2002 @ Clark County Government Center, Room ODC #3, 500 Grand Central Parkway, Las Vegas, NV

All meetings will begin at 7:00 p.m. and end on or near 9:00 p.m. A time limit may be placed on oral comments, depending on the number of people who wish to make a statement. Oral comments should be accompanied by a written synopsis of the presentation.

The comment period for the DEIS will end at close of business 60-days from the EPA publication date.

If you have any questions, please contact BLM Project Manager, Jerry Crockford at telephone (505) 599-6333 or cellular telephone (505) 486-4255.

Sincerely,

Angie C. Lara
for Mark T. Morse
Field Manager

Draft Environmental Impact Statement
Table Mountain Wind Generating Facility

Prepared for

U.S. Bureau of Land Management
Las Vegas Field Office
4765 Vegas Drive
Las Vegas, Nevada 89018

BLM Case Nos. N-73726 and N-57100

On Behalf of

Table Mountain Wind Company, LLC
4225 Executive Square, Suite 950
La Jolla, California 92037

Prepared by

PBS&J
901 North Green Valley Parkway, Suite 100
Henderson, Nevada 89074
PBS&J Job No. 511339.00

January 2002

Abstract

Table Mountain Wind Company, LLC (TMWC), a joint venture between Global Renewable Energy Partners, Inc. (GREP) and Siemens Energy and Automation, Inc., is proposing to develop a nominal 150- to 205-megawatt (MW) wind-powered electric generation facility (WGF) and ancillary facilities approximately 20 miles (mi) southwest of Las Vegas, at the south end of the Spring Mountain Range between the communities of Goodsprings, Sandy Valley, Jean, and Primm, Nevada. TMWC has applied for a 20-year-term right-of-way (ROW) grant from the Bureau of Land Management (BLM) Las Vegas Field Office to construct, operate, and maintain a WGF and ancillary facilities on approximately 325 acres (ac) of public land. The purpose of the proposed project is to provide wind-generated electricity from a site in southern Nevada to meet existing electricity needs and demonstrate the ability of wind energy to provide a reliable, economical, and environmentally acceptable energy resource in the region.

The BLM has a jurisdictional trust responsibility over these public lands, and because the proposed project is a major federal action, the preparation of an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) of 1969 is required to evaluate potential impacts and alternatives for project planning and environmental protection. The BLM has reviewed and approved the information and analyses set forth in this Draft EIS (DEIS).

This DEIS presents the alternatives under consideration and those considered but eliminated. This DEIS also documents the existing environmental setting and provides results of the analysis of these four alternatives that were considered: the Proposed Action, Alternative A, Alternative B, and the No-Action Alternative. Potential significant impacts (environmental consequences) to the environment are evaluated in this DEIS. Environmental issues addressed include potential impacts on the following:

- Geology, Seismicity, Soils, and Mining
- Surface Water Hydrology
- Groundwater Resources
- Biological Resources
- Transportation and Circulation
- Air Quality
- Visual Resources
- Noise
- Land Use
- Public Services, Utilities, and Electric and Magnetic Fields
- Hazardous Materials
- Cultural Resources
- Paleontological Resources
- Socioeconomics
- Environmental Justice
- Cumulative Impacts
- Indirect Impacts

Implementation of the Proposed Action or alternatives will result in significant impacts on visual resources from the proposed alternatives and potentially significant impacts on wildlife resources. Cultural Resources investigations are ongoing and thus a determination of the potential impacts with regards to construction and operation activities has not been made. Positive impacts to air quality and socioeconomic resources would result from the development and operation of the WGF. Potential significant impacts from construction and operation activities on the remaining resources are not anticipated. If the No-Action Alternative was selected, the purpose and need of the proposed project would not be met, and there would be no beneficial impacts on the economy of southern Nevada.

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Disclaimer

National Environmental Policy Act (NEPA) Disclosure Statement
Bureau of Land Management Environmental Impact Statement
Table Mountain Wind Power Plant

The President's Council on Environmental Quality (CEQ) regulations at 40 CFR 1506.5(c) require that consultants preparing an environmental impact statement (EIS) execute a disclosure specifying they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for the purposes of this disclosure is defined in the March 23, 1981, guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026-18038 at Questions 17a and b.

"Financial or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)." 46 FR 18026-18038 at 18031.

In accordance with these requirements, PBS&J has prepared this EIS on behalf of the Bureau of Land Management and declares no financial or other interest in the outcome of the proposed project.

Certified by:

Gary L. Galbraith — January 15, 2002

Gary Galbraith, EIS Manager — Date

PBS&J
901 North Green Valley Parkway, Suite 100
Henderson, Nevada 89104

Executive Summary

Introduction

Table Mountain Wind Company, LLC (TMWC), a joint venture between Global Renewable Energy Partners, Inc. (GREP) and Siemens Energy and Automation, Inc., is proposing to develop a nominal 150- to 205-megawatt (MW) wind-powered electric generation facility (WGF) and ancillary facilities approximately 20 miles (mi) southwest of Las Vegas, at the south end of the Spring Mountain Range between the communities of Goodsprings, Sandy Valley, Jean, and Primm, Nevada (Figure ES-1, p. xvi). TMWC has applied for a 20-year-term right-of-way (ROW) grant from the Bureau of Land Management (BLM) Las Vegas Field Office to construct, operate, and maintain a WGF and ancillary facilities on approximately 325 acres (ac) of public land located about 6 mi west of the junction of Interstate 15 (I-15) and the community of Jean, Nevada. The study area includes portions of Table Mountain, Shenandoah Peak, and an area north of Wilson Pass.

The project area lies entirely within the Las Vegas Resource Management Planning Area. The BLM must review and approve the proposed ROW grant between TMWC and the BLM as part of its responsibility to manage the public lands. The BLM approval of the ROW grant to TMWC is a *major federal action* as defined by the President's Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA) of 1969 as amended (40 CFR 1500 et seq.) and requires documentation of BLM compliance with NEPA. The BLM is the lead agency for the Environmental Impact Statement (EIS) preparation. This Draft EIS (DEIS) has been prepared in compliance with the CEQ regulations for implementing NEPA and the BLM guidelines (BLM 1988).

On December 29, 2000, the BLM published a Notice of Intent (NOI) in the Federal Register for the preparation of an EIS focusing on wind power projects and other planned energy projects in the Table Mountain area, notice of public meetings, request for interest in a ROW for a wind array, and requests for other applications for power generating facilities not known to the BLM. The NOI explained the proposed project and requested comments concerning issues and concerns that should be included in the EIS.

Public scoping meetings were held to explain the BLM resource management goals for the project area and their applicability to the proposed project, to the NEPA process, and to answer any questions about the proposed project and the issues to be discussed in the EIS. The first scoping meetings were held at the Clark County Government Center on January 16, 2001; the Sandy Valley Community Center on January 17, 2001; and the Goodsprings Community Center on January 18, 2001. The second round of scoping meetings were held at the Goodsprings Community Center on February 27, 2001; the Clark County Government Center on February 28, 2001; and the Sandy Valley School on March 1, 2001.

Issues and concerns identified by the public, BLM, and other governmental agencies and organizations and analyzed in the EIS are presented below.

- Soil stability
- Ground vibration impacts
- Impacts on water resources
- Impacts on paleontological resources
- Impacts on wildlife and wildlife habitat

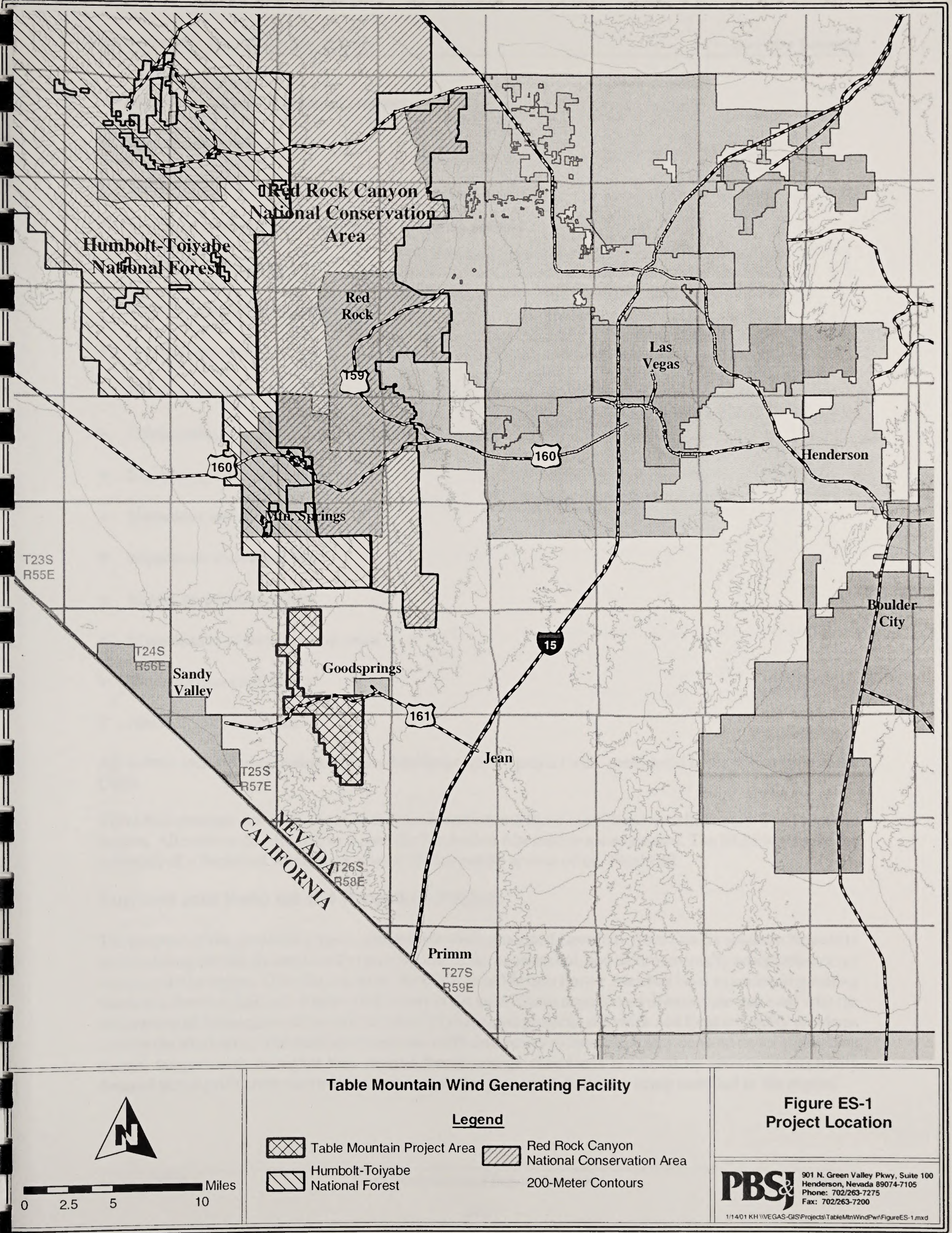

Figure ES-1
Project Location

- Impacts on migratory birds and raptors
- Impacts on aviation
- Cultural resources
- Increased roadway traffic and increased human activity
- Impacts on air quality
- Visual resources and aesthetics
- Impacts on noise
- Public accessibility to the area
- Public safety
- Electromagnetic interference
- Hazardous materials
- Impacts on socioeconomics
- Impact on property values
- Maintenance of facilities and roads
- Transmission capabilities
- Alternatives considered

All written and verbal comments received on the proposed project were considered in the preparation of the DEIS.

This DEIS presents the alternatives under consideration and those considered but eliminated. The Proposed Action, Alternative A, Alternative B, and the No-Action Alternative are evaluated. The BLM will make the selection of a Preferred Alternative after a 30-day public review of the Final EIS.

Purpose and Need for the Proposed Project

The purpose of the proposed project is to provide wind-generated electricity from a site in southern Nevada to meet existing electricity needs and to provide a reliable, economical, and environmentally acceptable energy resource in the region. Over the last year, the California-Mexico Power Area has been experiencing rolling blackouts due to a shortage of generated power in the area. These experiences demonstrate that even with the assumption of future generation and transmission expansion projects, statewide and local reliability problems exist in the short-term. The inability to provide sufficient power to meet electricity demand under higher than normal temperatures or higher than normal forced outage conditions is caused by growth in electricity demand that significantly exceeds the number of new generation facilities being installed in the region.

The projected capacity margins and fuel supplies are not anticipated to be adequate to ensure reliable operation in all areas of the region during the year 2001, and adequacy over the next 9 years assumes the timely construction of significant amounts of proposed new generation (NERC 2001). The development of a WGF and ancillary facilities on lands administered by the BLM in Clark County, Nevada, would aid in addressing electricity demand stresses in the region. Toward that end, the BLM initiated a competitive bidding process, during which it evaluated several WGF proposals, of which TMWC was declared the high bidder.

The proposed project would be a merchant plant providing energy via Valley Electric Association's (VEA's) transmission system to service the growing demand in the southern Nevada area; however, once the WGF system has entered into Nevada's power transmission system, the electricity generated by the project could also be wheeled to service customers on the electrical grid in other states.

Issuance of ROWs and temporary permits would be in accordance with the Federal Land Policy and Management Act (FLPMA) of 1976, as amended (43 U.S.C. 1761), 43 CFR § 2800, subsequent 2800 Manuals, Handbook 2801-1, and other guidance and instructions.

Alternatives Considered but Eliminated from Further Study

Several alternatives were considered for construction and operation of the WGF and ancillary facilities, but were eliminated because they did not meet the purpose and need or because other alternatives better satisfied the proposed project objectives. The range of alternatives and alternative WGF components included:

- Alternative locations, including the James Hardie Gypsum Mine and the Eldorado Valley Energy Zone
- Four alternative access roads.

The alternatives that were eliminated are described in detail in Chapter 2 of this DEIS. After screening the alternatives, BLM and TMWC selected the combination of Proposed Action and alternatives most likely to satisfy the energy development goals of the region, while meeting the other objectives of minimizing impacts on the environment and providing a cost-effective, efficient, and reliable project most able to respond to market power demands.

Summary of Alternatives Evaluated

Four alternatives were evaluated: the Proposed Action, Alternative A, Alternative B, and the No-Action Alternative. Each alternative is summarized below and is described in detail in Chapter 2 of this DEIS.

Proposed Action

Under the Proposed Action, the BLM would issue a ROW grant to TMWC for the construction, operation, and maintenance of a nominal 150- to 205-MW WGF and ancillary facilities on approximately 325 ac of public land within the Table Mountain Wind Generating Facility project area. The 4,500-ac project area is located in Clark County, in southern Nevada, approximately 20 mi south of Las Vegas and near the communities of Jean, Primm, Sandy Valley, and Goodsprings. The life-of-project (LOP) is projected to be 20 years and would employ 10 to 20 full-time employees. The WGF would operate up to 24 hours per day, 365 days per year, with an annual generating capacity of more than 460,000,000 kilowatt-hours (kWh) with maximum build-out of the project. Ancillary facilities would include 34.5-kilovolt (kV) electrical distribution lines, access and service roads, underground electric collection lines and communications cables, meteorological towers, a substation, and a communications control building. Total land disturbance under the Proposed Action would involve approximately 325 ac.

Under the Proposed Action, the fully constructed WGF would consist of an array of 153 wind turbine generators (WTGs) that would be located along the ridgelines of Table Mountain, Shenandoah Peak, and an area north of Wilson Pass. The WTGs would be a combination of the 900-kW NEG Micon (or comparable manufacturer and type) WTGs, rated at 800 kW for the site, and 1500-kW NEG Micon (or comparable manufacturer and type) WTGs. They would be supported on 140- to 290-foot (ft) tall conical (tubular) steel towers, with a foundation diameter of approximately 15 ft and spaced a minimum of 500 ft apart. Rotor diameters would range between 180 to 280 ft.

Approximately 19 mi of underground electric collection and communication lines would link each row or string of WTGs to a 13-mi overhead 34.5-kV electric distribution line system. The overhead distribution line system would connect each of the three energy-generating areas to the substation, where the electricity would be stepped up to connect to the existing VEA Mead-Pahrump 230-kV electric transmission line. Power would be delivered to customers through the 230-kV transmission line. The substation would be built within a 10-ac site.

Approximately 14 meteorological towers would be erected on 3-ft-diameter pier foundations along the peaks of the three energy-generating areas, primarily within the WTG string corridors.

Approximately 20.4 mi of service roads would be constructed and 8 mi of access roads would be improved or constructed to facilitate efficient and safe access to the WGF and ancillary facilities.

Construction-related activities would disturb approximately 754 ac within the project area. Approximately 429 ac would be reclaimed after completion of construction. Total permanent site disturbance under the Proposed Action would be 325 ac.

Alternative A

Under Alternative A, the BLM would issue a ROW grant for the construction, operation, and maintenance of a nominal 150-MW WGF within the Table Mountain Wind Generating Facility project area. The fully constructed WGF would consist of an array of 187 NEG Micon 900-kW (or comparable manufacturer and type) WTGs, rated at 800 kW for the site. All ancillary facilities and equipment would be the same as described for the Proposed Action except there would be 34 additional WTGs. This would result in a 0.5 ac increase in permanent site disturbance over the Proposed Action.

Alternative B

Under Alternative B, the BLM would issue a ROW grant for the construction, operation, and maintenance of a nominal 205-MW WGF within the Table Mountain Wind Generating Facility project area. The fully constructed WGF would consist of an array of 135 NEG Micon 1500 (or comparable manufacturer and type) WTGs with a nominal rating of 1500 kW. All ancillary facilities and equipment would be the same as described for the Proposed Action except there would be 18 fewer WTGs. This would result in a 0.3 ac decrease in permanent site disturbance from the Proposed Action.

No-Action Alternative

The No-Action Alternative represents a continuation of existing conditions. BLM would not issue a ROW grant to TMWC for the use of approximately 325 acres of public land for the construction, operation, and maintenance of a 150- to 205-MW WGF. This would result in lost economic opportunity for the nearby communities, including the City of Las Vegas and Clark County. Additionally, the air quality benefits of a nonpolluting energy-generating facility would be foregone. The project area would likely remain undeveloped unless other economic or recreational opportunities or uses were identified.

Summary of Environmental Impacts and Mitigations

Table ES-1 summarizes the impacts and mitigations identified for the Proposed Action, Alternative A, Alternative B, and the No-Action Alternative. Significance criteria were established for each resource in the Environmental Consequences sections in Chapter 4 of this DEIS.

Table ES-1. Summary of Impact Analysis and Mitigations for the Proposed Action, Alternative A, Alternative B, and the No-Action Alternative

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
Geology, Seismicity, Soils, and Mining					
Unique geologic conditions	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	None
Disturbance and erosional loss of soils	Moderate during construction and negligible for LOP; 754-ac initial disturbance and 325-ac disturbance for LOP	Moderate during construction and negligible for LOP; 754-ac initial disturbance and 325.5-ac disturbance for LOP	Moderate during construction and negligible for LOP; 754-ac initial disturbance and 324.7-ac disturbance for LOP	No impact	Avoid erosion-prone areas where feasible; implement appropriate and timely use of erosion and sedimentation control techniques/devices; adhere to stormwater management plan; application of water and chemical suppressants
Soil compaction and decreased productivity	Moderate during construction; negligible for LOP	Moderate during construction; negligible for LOP	Moderate during construction; negligible for LOP	No impact	Use appropriate reclamation techniques; restrict off-road vehicle travel
Earthquake damage to facilities	Negligible—very low earthquake potential; LOP	Negligible; LOP	Negligible: LOP	No impact	Construct facilities to seismic criteria for southern Nevada—Seismic Zone 2B
Interference with present or future mining activities	Negligible	Negligible	Negligible	Negligible	None
Surface Water Hydrology					
Flooding damage to facilities	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	None—not in 100- or 500-year flood plain

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
Alteration of surface drainages	Negligible—no significant long-term modification to drainages; LOP	Negligible—no significant long-term modification to drainages; LOP	Negligible—no significant long-term modification to drainages; LOP	No impact	Avoid drainages wherever feasible; implement BMPs including appropriate road and culvert design
Increased turbidity, salinity, and sedimentation of surface waters due to runoff from disturbed areas	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	Use appropriate sedimentation and erosion control techniques/devices; adhere to stormwater management plan and BMPs
Contamination of surface waters from accidental hazardous material spills	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	Adhere to hazardous materials management and spill prevention and control countermeasure plan
Groundwater Resources					
Alteration of groundwater quantity and/or quality	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	None
Paleonotological Resources					
Disturbance/destruction of important fossils	Negligible during construction and LOP	Negligible during construction and LOP	Negligible during construction and LOP	No impact	Avoid, recover, and/or monitor as determined during preconstruction BLM paleontological surveys; educate employees
Loss of important fossil materials due to private collection or vandalism	Negligible during construction and LOP	Negligible during construction and LOP	Negligible during construction and LOP	No impact	Avoid, recover, and/or monitor as determined during preconstruction BLM paleontological surveys; educate employees

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
Discovery of previously unknown fossils	Beneficial during construction	Same as Proposed Action but increased by approximately 22% from Proposed Action	Same as Proposed Action but decreased by approximately 12% from Proposed Action	Negligible—no new fossil discovery	None
Vegetation					
Removal of vegetation	Moderate; 754-ac initial disturbance and 325-ac disturbance for LOP	Moderate; 754-ac initial disturbance and 325.5-ac disturbance for LOP	Moderate; 754-ac initial disturbance and 324.7-ac for LOP	No impact	Minimize number and size of disturbance areas; implement appropriate and timely reclamation, erosion control, and revegetation; adhere to reclamation plan
Changes in vegetation diversity following reclamation and potential noxious weed infestation	Negligible; 754-ac initial disturbance and 325-ac disturbance for LOP	Negligible; 754-ac initial disturbance and 325.5-ac disturbance for LOP	Negligible; 754-ac initial disturbance and 324.7-ac disturbance for LOP	No impact	Use appropriate noxious weed control measures; restrict off-road vehicle travel; revegetate with native/approved species
Reclamation unsuccessful after 5 years	Negligible to significant; LOP and beyond	Negligible to significant and increased by approximately 0.5 ac from Proposed Action	Negligible to significant and reduced by approximately 0.3 ac from Proposed Action	No impact	Implement further BLM- approved reclamation efforts until successful revegetation achieved
Loss of special status species	Negligible to moderate during construction; negligible for LOP	Negligible to moderate during construction; negligible for LOP	Negligible to moderate during construction; negligible for LOP	No impact	Avoid, relocate, and/or stockpile seed; implement BLM/National Division of Forestry (NDOF)-approved salvage, transportation, and reclamation procedures; restrict off-road vehicle travel

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
			Wildlife		
Overall wildlife habitat	Moderate; 754-ac initial disturbance and 325-ac disturbance for LOP	Moderate; 754-ac initial disturbance and 325.5-ac disturbance for LOP	Moderate; 754-ac initial disturbance and 324.7-ac disturbance for LOP	No impact	Use appropriate design and placement of facilities; appropriate erosion control and reclamation techniques; appropriate monitoring, containment, and disposal of hazardous materials
Increased wildlife mortality from activities of man	Potentially significant during LOP	Potentially significant during LOP	Potentially significant during LOP	No impact	Use appropriate road design; adhere to posted speed limits; educate employees; appropriately contain and dispose of hazardous materials
Potential loss of individual desert tortoise and loss of habitat	Negligible during construction and LOP	Negligible during construction and LOP	Negligible during construction and LOP	No impact	Implement U.S. Fish and Wildlife Service reasonable and prudent measures as outlined in Section 7 Consultation
Loss of bighorn sheep crucial habitat	Moderate to significant	Moderate to significant	Moderate to significant	No impact	Minimize project activities in these areas when feasible; implement appropriate reclamation
Bighorn sheep displacement and/or stress	Significant during construction; moderate for LOP	Significant during construction; moderate for LOP	Significant during construction; moderate for LOP	No impact	Avoid construction and minimize other activities within crucial habitats during crucial periods

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	Proposed Action	Alternative A	Alternative B	No-Action Alternative	Mitigation(s)
Increased bighorn sheep mortality from activities of man	Moderate to significant	Moderate to significant	Moderate to significant	No impact	Avoid construction and minimize other activities within crucial habitats during crucial periods; install signage; improve water availability; conduct postconstruction studies on limits of human tolerance
Avian mortality due to collisions with WTGs or power lines	Negligible to potentially significant; LOP	Negligible to potentially significant; LOP	Negligible to potentially significant; LOP	No impact	Use appropriate design and placement of facilities; conduct postconstruction monitoring and studies
Bat mortality due to collisions with WTGs or power lines	Negligible to potentially significant; LOP	Negligible to potentially significant; LOP	Negligible to potentially significant; LOP	No impact	Use appropriate design and placement of facilities; install beeping-tower technology; conduct postconstruction monitoring and studies
Potential loss of banded Gila monster and/or chuckwalla and loss of habitat	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	Restrict off-road vehicle travel; educate employees; report encounter to the National Division of Wildlife (NDOW); relocate or remove species per NDOW procedures

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
Wild horse and burro displacement during construction and O&M	Negligible	Negligible	Negligible	No impact	Use appropriate roadway signage to alert traffic to the potential of encounters, installation of guy-wire barriers associated with overhead electric transmission lines, and habitat restoration efforts as outlined in the Habitat Restoration Plan. Implementation of these measures would be coordinated with BLM Wild Horse and Burro Program staff and NDOW.
Threatened and Endangered Species					
Mortality or disturbance of any listed or candidate threatened and endangered species or disturbance of critical habitat for listed or candidate threatened and endangered species	Negligible to significant; LOP	Negligible to significant; LOP	Negligible to significant; LOP	No impact	Design and place facilities to minimize mortality; use monitoring to improve design to further mitigate impacts; minimize habitat disturbance; restrict off-road vehicle travel; implement appropriate and timely reclamation and revegetation
Reduction in state sensitive species due to mortality or habitat removal	Negligible to moderate; LOP	Negligible to moderate; LOP	Negligible to moderate; LOP	No impact	Avoid habitats of potential occurrence, where feasible

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
Destruction of threatened, endangered, candidate, and sensitive (TEC&S) plant species or their habitats	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	Preconstruction surveys for TEC&S; avoidance of individuals or habitat, where feasible
Cultural Resources					
Impacts cannot be determined at this time. BLM and the Nevada State Historic Preservation Office have not yet made eligibility determinations of sites pending testing. Requests for formal consultation with Native American tribes have been received.					
Transportation and Circulation					
Decrease in level of service (LOS) results in adverse impacts on public safety	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	None; coordinate with BLM and Clark County prior to improving existing roads and constructing new roads
Climate and Air Quality					
Increases in emissions and particulates	Temporary and localized during construction; negligible during LOP	Temporary and localized during construction; negligible during LOP	Temporary and localized during construction; negligible during LOP	No impact	Regularly maintain roads and equipment; implement dust control permit mitigation measures/procedures, including speed limits, soil stabilization, and revegetation
No additional pollutant emissions due to fossil-fuel burning for electricity generation	Beneficial; national or global scale; LOP and beyond	Beneficial; national or global scale; LOP and beyond	Beneficial; national and global; LOP and beyond	Electric power may be generated by a polluting resource; negligible; LOP	None
Visual Resources					
Modification in the basic elements (form, line, color, or texture) of visual resources by presence of facilities and equipment	Significant	Significant	Significant	No impact	None

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
Glare impacts from lighting	Negligible to significant; LOP	Negligible to significant; LOP	Negligible to significant; LOP	No impact	Implement Federal Aviation Administration (FAA)-approved lighting plan
Noise					
Increased noise levels near residences and within crucial wildlife habitats during critical periods	Temporary and localized during construction; negligible during LOP	Temporary and localized during construction; negligible during LOP	Temporary and localized during construction; negligible during LOP	No impact	Use equipment mufflers and perform work during daylight hours during construction period; ensure regular maintenance of WTGs and ancillary facilities and equipment
Recreation					
Changes in character and recreational uses of the area due to construction, presence of facilities, noise, dust, odor, and increased human activities	Moderate and temporary during construction; negligible during LOP	Moderate and temporary during construction; negligible during LOP	Moderate and temporary during construction; negligible during LOP	No impact	Maintain roads as appropriate; use equipment mufflers; minimize disturbance areas; implement appropriate and timely reclamation
Potential increased tourism opportunities	Beneficial to local businesses	Beneficial to local businesses	Beneficial to local businesses	No impact	None
Land Use					
Substantial conflict with existing uses and management goals	Moderate and temporary during construction; negligible during LOP	Moderate and temporary during construction; negligible during LOP	Moderate and temporary during construction; negligible during LOP	No impact	Maintain roads as appropriate; use equipment mufflers; minimize disturbance areas; implement appropriate and timely reclamation
Infringement on prior rights	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	None

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
Public Services, Utilities, and Electromagnetic Fields					
Increased demand for emergency services	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	Coordinate with communities of Goodsprings and Jean; train employees
Decrease of solid waste services and landfill capacity	Moderate during construction; Negligible for LOP	Moderate during construction; Negligible for LOP	Moderate during construction; Negligible for LOP	No impact	Implement waste minimization efforts and recycling program
Increase in electric and magnetic fields from transmission lines	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	Avoid locating transmission lines in residential areas; design facilities and equipment to minimize emissions
Hazardous Materials					
Potential minimal damage to, or loss of, soil, vegetation, wildlife; potential danger to humans from potential hazardous materials spill and disposal	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	Compliance with OSHA; implement spill prevention, control, and countermeasures plan; TMWC responsible for clean-up per EPA standards
Potential minimal damage to, or loss of, soil, vegetation, wildlife; potential danger to humans from potential spills or leaks due to transportation of hazardous materials	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	Compliance with OSHA; implement spill prevention, control, and countermeasures plan; implement hazardous materials management plan

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
Potential minimal damage to, or loss of, soil, vegetation, wildlife; potential minimal danger to humans from potential spills or leaks due to handling and storage of hazardous materials	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	Implement hazardous materials management plan; store chemicals in on-site facilities equipped within spill containment facilities; employee training
Socioeconomics					
Increased employment in Clark County	Beneficial; short-term and LOP	Beneficial; short-term and LOP	Beneficial; short-term and LOP	Negligible	None
Increase in tax revenues, capital investment, and stimulation of economy in Clark County	Beneficial; short-term and LOP	Beneficial; short-term and LOP	Beneficial; short-term and LOP	Negligible	None
Increase in population	Negligible—adequate infrastructure exists; LOP	Negligible; LOP	Negligible; LOP	No impact	Employ as many local personnel as possible
Increase in housing	Negligible to beneficial—numerous vacancies exist; LOP	Negligible; LOP	Negligible; LOP	No impact	Employ as many local personnel as possible
Increase in demand for local government facilities or services	Negligible—adequate infrastructure exists and revenues will be available; LOP	Negligible; LOP	Negligible; LOP	No impact	Employ as many local personnel as possible
Increase in demand for school services	Negligible—adequate classroom space available; LOP	Negligible; LOP	Negligible; LOP	No impact	Employ as many local personnel as possible
Disruption or change of character of communities	Negligible—towns developed during boom and bust cycles; LOP	Negligible; LOP	Negligible; LOP	No impact	Employ as many local personnel as possible

Table ES-1. (continued).

Post-Mitigation Impacts					
Impact by Environmental Review	**Proposed Action**	**Alternative A**	**Alternative B**	**No-Action Alternative**	**Mitigation(s)**
Reduction in electricity rate increases	Beneficial; LOP	Beneficial; LOP	Beneficial; LOP	Negligible; electric rates not likely to be reduced unless other energy sources found and developed	None
			Environmental Justice		
Minority or low-income populations experience disproportionate share of adverse socioeconomic impacts	Negligible; LOP	Negligible; LOP	Negligible; LOP	No impact	None

Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
µPa	microPascal
ac	acre
afy	acre-foot per year
AIRS	Aerometric Information Retrieval System
ANSI	American National Standards Institute
APE	Area of Potential Effect
ARPA	Archeological Resources Protection Act
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
BEPA	Bald Eagle Protection Act
BLM	Bureau of Land Management
BMP	Best Management Practice
BRP	Basin and Range Province
ca.	circa
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	President's Council on Environmental Quality
CO	carbon monoxide
CO_2	carbon dioxide
dB	decibel
dB(A)	decibel weighted on the A-scale
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMF	electric and magnetic field
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FLPMA	Federal Land Policy and Management Act of 1976
ft	foot (feet)
ft^2	square foot/feet
gpm	gallons per minute
GREP	Global Renewable Energy Partners

HMA	Herd Management Area
HMMP	Hazardous Materials Management Plan
HUD	U.S. Department of Housing and Urban Development
Hz	hertz
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronic Engineers
IPCEA	Insulated Power Cables Engineers Association
I-15	Interstate Highway 15
kHz	kilohertz
KOP	Key Observation Point
kV	kilovolt
kV/m	kV per meter
kW	kilowatt
kWh	kilowatt-hour
lb	pound
LOP	life-of-project
LOS	level of service
LVMPD	Las Vegas Metropolitan Police Department
LVMSA	Las Vegas Metropolitan Statistical Area
m	meter
MBTA	Migratory Bird Treaty Act
mG	milligauss
mi	mile
mph	miles per hour
MSHCP	Multiple-Species Habitat Conservation Plan
msl	mean sea level
MVA	megavolt ampage
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NETA	National Electrical Testing Association
NDOF	Nevada Division of Forestry
NDOT	Nevada Department of Transportation
NDOW	Nevada Division of Wildlife
NEMA	National Electrical Manufacturer's Association
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Council
NESC	National Electric Safety Code

NHPA	National Historic Preservation Act
NM 900	NEG Micon 900 wind turbine generator
NM 1500	NEG Micon 1500 wind turbine generator
NO_2	nitrogen dioxide
NOx	nitrogen oxide
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service (formerly the Soil Conservation Service)
NRHP	National Register of Historic Places
NRS	Nevada Revised Statute
NTP	Notice To Proceed
O_3	Ozone
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
POD	Plan of Development
PM	particulate matter
PM_{10}	particulate matter with a diameter less than 10 microns
$PM_{2.5}$	particulate matter with a diameter less than 2.5 microns
PSD	prevention of significant deterioration
psi	pounds per square-inch
PVC	polyvinyl chloride
RMP	Resource Management Plan
ROS	Recreation Opportunity Spectrum
ROW	right-of-way
rpm	revolutions per minute
RRCNCA	Red Rock Canyon National Conservation Area
RUS	Rural Utility Standard
SARA	Superfund Amendments and Reauthorization Act
SF_6	sulphur hexafluoride
SH 159	State Highway 159
SH 160	State Highway 160
SH 161	State Highway 161
SO_2	sulfur dioxide
SOC	species of concern
SPCCP	Spill Prevention Control and Countermeasures Plan
sq ft	square foot/feet
sq mi	square mile
TMWC	Table Mountain Wind Company, LLC

TSCA	Toxic Substance Control Act
T&E	threatened and endangered
TEC&S	threatened, endangered, candidate, and sensitive (species)
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
V	volt
VEA	Valley Electric Association
VMT	vehicle mile traveled
VOC	volatile organic compound
VRM	Visual Resource Management
WGF	wind-powered electric generation facility
WSA	Wilderness Study Area
WTG	wind turbine generator
yd^3	cubic yard

1.0 PURPOSE AND NEED

The need for the Table Mountain wind-powered electric generation facility (WGF) is the production and transmission of energy. The proposed project is consistent with Executive Order 13212, which states that production and transmission of energy in a safe and environmentally sound manner is essential to the well-being of the American people.

The purpose of the Proposed Action is to provide wind-generated electricity from a site in southern Nevada to meet existing and future electricity needs and demonstrate the ability to provide a reliable, economical, and environmentally acceptable energy resource in the region. Demand for electric power in the west and southwest U.S. exceeds capacity and continues to increase. Peak demand and annual energy requirements for the Arizona–New Mexico–Southern Nevada Power Area (Arizona, most of New Mexico, westernmost Texas, southern Nevada, and part of southeast California) are projected to grow at respective annual compound rates of 3.3 and 3.4% over the period 2000 through 2010 (North American Electric Reliability Council (NERC) 2001). Peak demand for the California–Mexico Power Area, which includes most of California and the northern portion of Baja California, Mexico, is predicted to grow at respective annual compound rates of 2.6 and 2.8% for the period 2001 through 2010 (NERC 2001). The Western Systems Coordination Council assumes approximately 66,849 MW of new generation will be built in the region over the next 10 years to maintain reliable operations of the transmission system.

Over the last year, the California-Mexico Power Area has been experiencing rolling blackouts due to a shortage of generated power in the area. These experiences demonstrate that even with the assumption of future generation and transmission expansion projects, statewide and local reliability problems exist in the short-term. The inability to provide sufficient power to meet electricity demand under higher than normal temperatures or higher than normal forced outage conditions is caused by the growth in electricity demand, which significantly exceeds the number of new generation facilities being installed in the region. The projected capacity margins and fuel supplies are not anticipated to be adequate to ensure reliable operation in all areas of the region during the year 2001, and adequacy over the next 9 years assumes the timely construction of significant amounts of proposed new generation (NERC 2001).

The development of a WGF and ancillary facilities on public lands, administered by the BLM in Clark County, Nevada, would aid in addressing electricity demand stresses in the region. Toward that end, the BLM initiated a competitive bidding process, during which it evaluated several WGF proposals, and of which Table Mountain Wind Company, LLC (TMWC) was declared the high bidder.

The federal action associated with the proposed development would be the issuance of the ROW grant by the BLM for construction, operation, and maintenance of the nominal 150- to 205-MW WGF and ancillary facilities, including a substation, distribution lines, access roads, and meteorological towers. The ROW grant would have a 20-year term and could be renewed indefinitely. For the purpose of this Draft Environmental Impact Statement (DEIS), the life-of-project (LOP) is assumed to be 20 years.

The BLM approval of the proposed TMWC ROW is a *major federal action* as defined by the President's Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA) of 1969 as amended (40 CFR 1500 et seq.) and requires documentation of BLM compliance with NEPA. This DEIS has been prepared in compliance with the CEQ regulations for implementing NEPA and the BLM guidelines (BLM 1988).

1.1 BLM Policies, Plans, and Programs

The development of energy resources is an integral part of the BLM management program under the authority of the Federal Land Policy and Management Act (FLPMA) of 1976 (43 CFR 1600). All BLM land uses in southern Nevada are managed under the Las Vegas Resource Management Plan (RMP) (BLM 1998), as

mandated by FLPMA. The RMP was developed through the NEPA process and allows for the use of public lands under a multiple-use/sustained-yield philosophy. The RMP consists of a "combination of management directions, allocations, and guidelines that will direct where actions may occur, the resource conditions to be maintained, and use limitations required to meet management objectives." Thus, the RMP is the primary planning document that governs development of the Proposed Action. For all BLM land within the study area, this RMP replaces the Clark County Management Framework Plan (BLM 1983). Issuance of ROWs and temporary permits would be in accordance with FLPMA, as amended (43 U.S.C. 1761), 43 CFR § 2800, subsequent 2800 Manuals, Handbook 2801-1, and other guidance and instructions.

1.1.1 Project Conformance with Land Use Plans

The proposed project conforms with applicable federal authorizations, permits, and regulations, which are listed in Table 1-1 (p. 1-3), as well as with the objectives and directives of the Las Vegas RMP.

The BLM manages the lands within the study area primarily for recreation, conservation, mining, and scattered communications sites and utility corridors. The RMP indicates that public lands within the Proposed Action area are suitable for the development of a WGF, subject to certain stipulations to protect important natural resources when siting generation or utility facilities. This DEIS is tiered to the RMP (BLM 1998). Objective RW-1 of the RMP is to meet public demand and reduce impacts to sensitive resources by providing an orderly system of development for transportation, including legal access to private inholdings, communications, flood control, major utility transmission lines, and related facilities (BLM 1998). Management Direction RW-1-h provides direction that all public land within the planning area, except as stated in RW-1-g, are available at the discretion of the agency for ROWs under the authority of FLPMA (BLM 1998).

1.2 Authorizing Action

Table 1-1 (p. 1-3) lists relevant federal, state, and local regulatory permits and approvals that may be required for compliance. The following federal, state, and local management plans contain information relevant to the proposed project:

- Federal Land Policy Management Act (FLPMA)
- Clark County Desert Conservation Plan
- Clark County Carbon Monoxide Air Quality Implementation Plan
- Las Vegas Resource Management Plan and Final Environmental Impact Statement
- Clark County Draft Enterprise Plan
- Clark County Comprehensive Plan

The Proposed Action may be subject to some or all of the laws and regulations in Table 1-2 (p. 1-4).

In addition to the Final EIS (FEIS) and associated decision documents, the BLM would issue a ROW grant to construct the WGF on public lands. Prior to construction of each phase of the project, the BLM would issue a Notice To Proceed (NTP). Power line and road ROW on public lands would be issued under the authority of Title V of the FLPMA of 1976. Access roads would conform to Clark County road standards and special stipulations as designated by the BLM. Common stipulations include provisions for the protection of:

- Wildlife resources

Table 1-1. Regulatory Permits and Approvals Which May Be Required for the Proposed Action.

Agency	Permit/Approval
Federal	
U.S. Bureau of Land Management	National Environmental Policy Act Record of Decision for project
	Approval of ROW grants and temporary construction area permit under the authority of FLPMA
	Section 106 review and recommendation
	U.S. Department of the Interior Bureau of Land Management ROW Grant/Temporary-Use Permit
U.S. Fish and Wildlife Service	Endangered Species Act Section 7 Consultation and Biological Opinion
U.S. Army Corps of Engineers	Section 404/Section 10 Permit
	401 Water Quality Certification
	402 National Pollutant Discharge Elimination System General Stormwater Permit for Construction Activities
	Prevention of Significant Deterioration Program Authority to Construct Permit
U.S. Environmental Protection Agency	401 Water Quality Certification
	402 National Pollutant Discharge Elimination System General Stormwater Permit for Construction Activities
	Prevention of Significant Deterioration Program Authority to Construct Permit
State	
State of Nevada Historic Preservation Office	Section 106 review and concurrence: State Historic Preservation Act
Nevada Division of Wildlife Region 3	Project Review: Wildlife and Habitat Consultation for disturbance on BLM land
Nevada Public Utility Commission	Utility Environmental Protection Act
Nevada State Fire Marshall	Hazardous Materials Storage Permit/Nevada Combined Agency Permit/Tier II
County	
Clark County Comprehensive Planning	Collection of habitat compensation fees for disturbed BLM land, and collection of desert tortoise habitat compensation fees
Clark County Regional Flood Control District (CCRFCD)	Check of Federal Emergency Management Agency Maps and CCRFCD plan for transmission lines
Clark County Health District Air Pollution Control Division	Dust Control Permit
	Grading Permit

Table 1-2. Environmental Laws and Regulations.

Law	Record
National Environmental Policy Act (NEPA)	42 USC 4321 et seq.
Council of Environmental Quality (CEQ) general regulations implementing NEPA	40 CFR Parts 1500–1508
Department of the Interior's (DOI) Implementing Procedures and proposed revisions (August 28, 2000, Federal Register)	516 DM 1–7
Bureau of Land Management's (BLM) NEPA Handbook	H-1790-1 (1988)
National Historic Preservation Act (NHPA) and regulations implementing NHPA	16 USC 470 et seq. 36 CFR 800
Antiquities Act of 1906	16 USC 431 et seq.
American Indian Religious Freedom Act (AIRFA)	42 USC 1996 et seq.
Archeological Resources Protection Act (ARPA), as amended	16 USC 470aa et seq.
Native American Graves Protection and Repatriation Act of 1990 (NAGPRA)	25 USC 3001
Clean Air Act (CAA)	42 USC 7401 et seq.
Clean Water Act (CWA)	33 USC 1251 et seq.
Endangered Species Act (ESA)	16 USC 1531 et seq.
Resource Conservation and Recovery Act (RCRA)	42 USC 6901 et seq.
Noise Control Act of 1972 (NCA), as amended	42 USC 4901 et seq.
Occupational Safety and Health Act (OSHA)	29 USC 651 et seq. (1970)
Pollution Prevention Act (PPA) of 1990	42 USC 13101 et seq.
Safe Drinking Water Act (SDWA)	42 USC s/s 300f et seq. (1974)
NEPA, Protection and Enhancement of Environmental Quality	Executive Order 11512
National Historic Preservation	Executive Order 11593
Floodplain Management	Executive Order 11988
Protection of Wetlands	Executive Order 11990
Federal Compliance with Pollution Control Standards	Executive Order 12088
Environmental Justice	Executive Order 12898
Indian Sacred Sites	Executive Order 13007
Consultation and Coordination with Indian Tribal Governments	Executive Order 13084
Invasive Species	Executive Order 13112
Government-to-Government Relations with Native American Tribal Governments	Memorandum for the Heads of Executive Department and Agencies (signed by President Clinton on April 29, 1994)
Departmental Responsibilities for Indian Trust Resources	Secretarial Order 3175, as amended (November 8, 1993)
American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act	Secretarial Order 3206 (June 5, 1997)
Federal Land Policy and Management Act (FLPMA) of 1976	43 USC 1701 et seq.
BLM Right-of-Way Regulations	43 CFR 2800
Wild Free-Roaming Horse and Burro Act of 1971	Public Law 92-195

- Threatened and endangered (T&E) species
- Cultural resources
- Paleontological resources
- Wetland/riparian areas
- Current land uses
- Water resources
- Visual resources
- Air quality

1.3 Issues and Concerns

On December 29, 2000, the BLM published a Notice of Intent (NOI) in the Federal Register for the preparation of an EIS focusing on wind power projects and other planned energy projects in the Table Mountain area. The NOI gave notice of public meetings, sought requests for interest in a ROW for a wind array, and requested other applications for power-generating facilities not known to the BLM. The NOI explained the proposed project and requested comments concerning issues and concerns that should be included in the EIS.

Public scoping meetings were held for the proposed project. The first round of scoping meetings were held in the form of an "open house," giving each entity filing a letter of interest the opportunity to present informational brochures, models, or other presentations addressing their planned facilities. The public was encouraged to ask questions, provide comments, and voice concerns. Public comment forms were available at the scoping meetings and the public was encouraged to complete them and return them to the BLM. The first scoping meetings were held at the Clark County Government Center on January16, 2001; the Sandy Valley Community Center on January 17, 2001; and the Goodsprings Community Center on January 18, 2001.

A second round of public scoping meetings was held in the same three communities and consisted of a presentation by BLM, TMWC, and the applicant's consultant, PBS&J. The presentations discussed BLM's role in the project, the project description, and the EIS/NEPA process. An open forum followed the presentation, allowing the public to ask questions and voice comments and concerns. Public comment forms were made available and the public was urged to complete them and return them to the BLM. The second round of scoping meetings were held at the Goodsprings Community Center on February 27, 2001; Clark County Government Center on February 28, 2001; and Sandy Valley School on March 1, 2001.

Issues and concerns identified by the public, BLM, and other governmental agencies and organizations and analyzed in the DEIS are presented below.

- Soil stability
- Ground vibration impacts
- Impacts on water resources
- Impacts on paleontological resources

- Impacts on wildlife and wildlife habitat
- Impacts on migratory birds and raptors
- Impacts on aviation
- Cultural resources
- Increased roadway traffic and increased human activity
- Impacts on air quality
- Visual resources and aesthetics
- Impacts on noise
- Public accessibility to the area
- Public safety
- Electromagnetic interference
- Hazardous materials
- Impacts on socioeconomics
- Impacts on property values
- Maintenance of facilities and roads
- Transmission capabilities
- Alternatives considered

1.4 Environmental Impact Statement Organization and Preparation

This DEIS is organized as follows:

- Chapter 2—Discusses the Proposed Action and other alternatives considered for the project, including the No-Action Alternative.
- Chapter 3—Characterizes existing environmental conditions of the proposed project area.
- Chapter 4—Discusses the impacts that would result if the Proposed Action or the alternative actions were implemented. This chapter also describes cumulative impacts, unavoidable adverse impacts, irreversible and irretrievable commitment of resources, and short-term uses versus long-term productivity.
- Chapter 5—Describes the mitigation measures needed to reduce, minimize, or avoid impacts.
- Chapter 6—Provides the record of consultation and coordination with agencies and the public.

- Chapter 7—Provides the list of reviewers and contributors of the DEIS.
- Chapter 8—Lists references and literature cited.
- Appendices

This DEIS was prepared by a third-party contractor PBS&J, Las Vegas, NV, with the BLM (Las Vegas Field Office) as the lead agency providing guidance, input, participation, and independent evaluation. The BLM, in accordance with 40 CFR 1506.5 (a) and (b), are in agreement with the findings of the analysis and approve and take responsibility for the scope and content of this document.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Proposed Action and alternatives were developed through a public and agency process combined with environmental and technical analyses. On December 29, 2000, the BLM issued an NOI (2001) to:

- Prepare an EIS
- Provide notice of EIS public scoping meetings for construction of an array of WTGs and ancillary facilities and other power generating facilities in the Table Mountain area of Clark County, Nevada
- Request statements of interest in acquiring a ROW for an array of WTGs and ancillary facilities
- Request other potential applications for power generating facilities not known to BLM in the same area.

The NOI provided a description of this scoping process and the major issues that, at a minimum, would be addressed in the EIS including air quality, geology and soils, surface and groundwater resources, biological resources, archeological and cultural resources, socioeconomic conditions, land use, and environmental justice. The NOI included a request for comments on the Proposed Action and announced the date, time, and location of three public meetings. The first round of public scoping meetings was held to solicit comments on the project and identify issues that should be addressed in the EIS.

In February 2001 the BLM, through a competitive ROW process, awarded TMWC the opportunity to submit for ROW the applications to develop a wind-powered generation facility and ancillary facilities on public land for the Table Mountain Wind Generating Facility. Presentations of the Proposed Action were made at the second round of public scoping meetings held in Goodsprings, Las Vegas, and Sandy Valley on February 27, 28, and March 1, 2001, respectively. No alternatives in addition to those already under consideration were proposed as a result of this public scoping process. The Proposed Action is designated the Agency Preferred Alternative.

This chapter describes the Proposed Action, Alternative A, Alternative B, and the No-Action Alternative and two alternative locations and four alternative access roads that were considered but eliminated from further consideration. Alternatives were eliminated because:

- They did not meet the purpose and need for the project
- Other alternatives were deemed to better satisfy the project objectives
- Technical or operational constraints existed.

The NEPA guidelines specify that the lead and cooperating agencies must also consider the effects of not approving or implementing a proposed action (called the status quo option or No-Action Alternative). The applicable federal, state, and local laws, permits, and regulatory approvals required for the Proposed Action are summarized in Table 1-1 (p. 1-3) and Table 1-2 (p. 1-4) in Chapter 1.

2.1 Proposed Site

The proposed Table Mountain Wind Generating Facility would be located in Clark County in southern Nevada near the communities of Sandy Valley, Goodsprings, Jean, and Primm. The proposed project site is located approximately 20 mi south of Las Vegas, approximately 10.3 mi north of Primm, approximately 5.7 mi east of Sandy Valley, and approximately 1.1 mi west of Goodsprings in the Springs Mountain Range (Figure 2-1, p. 2-2). The site is accessible from Interstate 15 (I-15), State Highway 161 (SH 161),

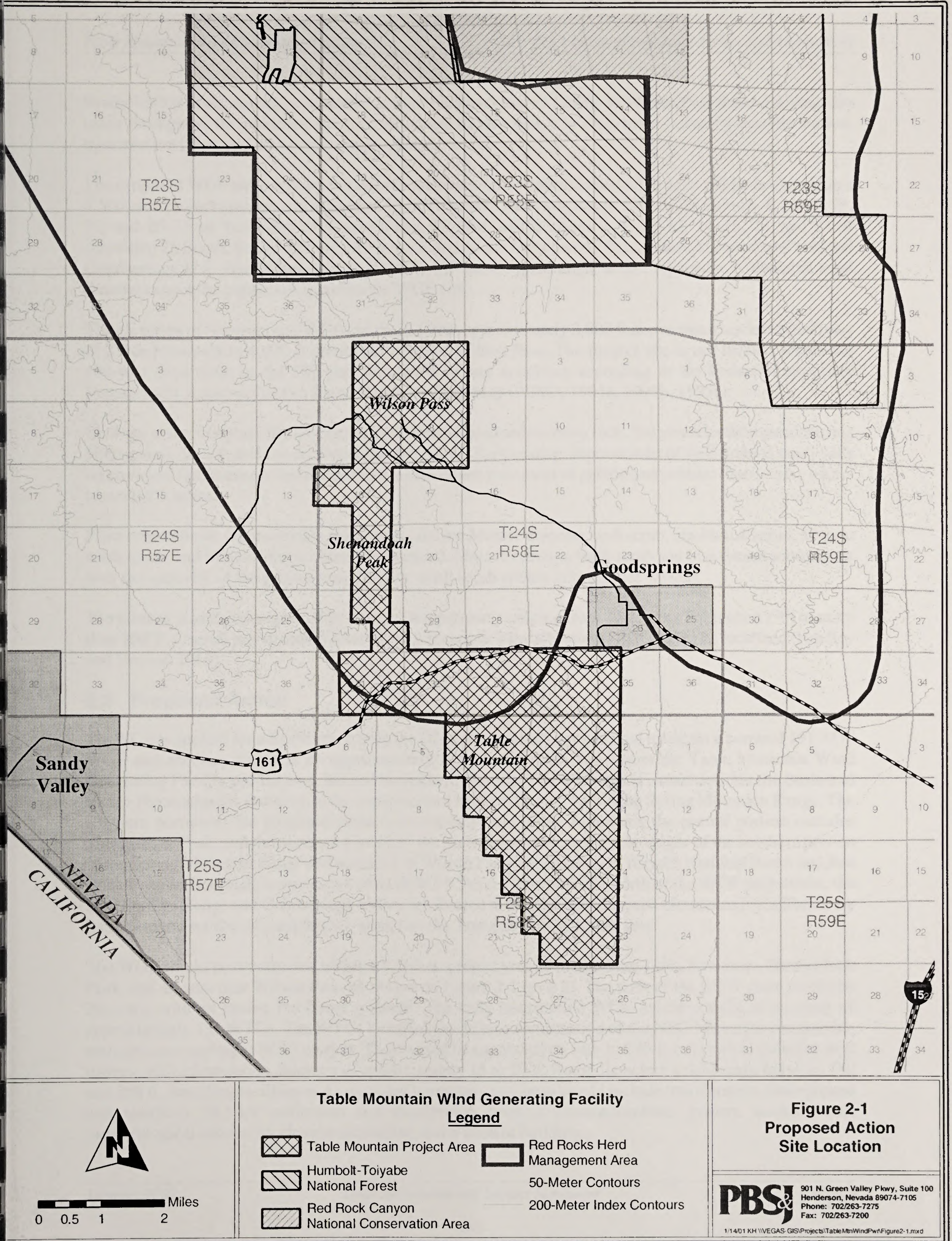

Figure 2-1
Proposed Action
Site Location

Sandy Valley Road, and an undedicated unimproved road known locally as Wilson Pass Road. Existing dirt roads throughout the proposed site provide access to microwave towers, radio towers, a weather station, transmission lines, and numerous mining claims.

The proposed WGF and ancillary facilities would encompass approximately 325 ac of public lands within a 4,500-acre project area located in Section 13 of Township 24 South, Range 57 East; Sections 5–8, 18, 19, 21, 22, and 26–35 of Township 24 South, Range 58 East; and Sections 2–4, 10–12, 14–16, 22, and 23 of Township 25 South, Range 58 East, which are found on the Cottonwood Pass, Potosi, Shenandoah Peak, and Goodsprings U.S. Geological Survey (USGS) 7.5-minute quadrangle maps. Appendix A contains legal descriptions of the public lands within the WGF site.

The elevation of the proposed WGF site ranges from approximately 3,800 ft above mean sea level (msl) east of Table Mountain to 6,070 ft above msl north of Wilson Pass. The project site is not located within the 100-year floodplain or the 500-year floodplain of any waterway according to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FEMA 1995a, 1995b, 1995c).

Geology at the site generally consists of well-consolidated sedimentary rock. Barren rock outcrops consisting of limestone, basalt, and site are located on the ridges. Surrounding slopes consist of well-drained sandy soils on erosional fan remnants and are covered with a desert pavement of pebble and cobbles that overlay a line-cemented hardpan.

Plant communities represented in the project area are Mojave creosote bush scrub, blackbrush scrub, Mojave wash scrub, and Mojave pinyon-juniper woodland. Mojave creosote bush scrub and blackbrush scrub occur over the majority of the project area. Mojave wash scrub occurs in the major washes.

The climate is arid, accompanied by extreme temperatures ranging from 20 degrees Fahrenheit (°F) to more than 100°F. Overall precipitation is very low, with erratic rainfall patterns that tend to be localized (Bradley and Deacon 1965).

2.2 Proposed Action

TMWC has applied for a ROW grant from the BLM to construct, operate, and maintain a nominal 191-MW WGF and ancillary facilities on approximately 325 ac of public land within the Table Mountain Wind Generating Facility project area, located in southern Nevada. The WGF site is situated within the Basin and Range Physiographic Province in the southwestern Mojave Desert, within the Spring Mountain Range. The southern portion of the proposed project site encompasses Table Mountain, the central portion includes Shenandoah Peak, and the northern portion of the project site is located on the ridges of the southern portion of the Spring Mountain Range and northeast of Wilson Pass. The Humboldt-Toiyabe National Forest and Red Rock Canyon National Conservation Area (RRCNCA) are located to the north of the WGF project site, the Bird Springs Range and Goodsprings Valley are located to the east, the Mesquite Mountains in California are located to the southwest, and further west, lies the Tonopah Range Mountains.

The WGF would be constructed within a 4,500-ac project area encompassing Table Mountain, Shenandoah Peak, and an area near Wilson Pass, as shown on Figure 2-1 (p. 2-2). The term of the ROW grant would be 20 years, with an option for future renewal. The fully constructed WGF would consist of an array of approximately 153 WTGs. The WTGs installed would be a combination of the NEG Micon (or comparable manufacturer and type) WTG models. They would be supported on 140- to 280-ft-tall conical (tubular) steel towers, with a foundation diameter of approximately 15 to 20 ft. Rotor diameters would range between 180 and 280 ft. Ancillary facilities and associated temporary use areas would include transformers, underground and overhead 34.5-kV collection and distribution lines, a communications system, access roads, meteorological towers, an electric substation, and a control building.

[illegible]

[illegible]

[illegible]

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[illegible]

[illegible]

[illegible]

[illegible]

TMWC and VEA are partnering to develop interconnection facilities to deliver the wind-generated power at Table Mountain to the local power grid. Joint engineering studies demonstrate that the proposed generation would utilize surplus capacity within the VEA transmission system via the existing Mead-Pahrump 230-kV transmission line. Under the Proposed Action, the BLM would issue an amendment to VEA's existing ROW grant (N-57100) for the purpose of interconnecting the WGF generation with the existing Mead-Pahrump transmission line. VEA would be responsible for designing, constructing, and maintaining the electric substation. The substation would contain interconnection facilities that include 230-kV switching and transformation equipment. A Plan of Development for the Table Mountain substation has been submitted by VEA to the BLM concurrent with TMWC's application for the WGF. The identification of impacts on resources associated with substation development and maintenance are addressed in this DEIS.

In addition to the ROW grant for the WGF location and ancillary facilities, temporary permits would be required for ancillary improvements associated with the project. Temporary use permits are issued for additional public lands necessary for project construction outside of the permanent ROW. The temporary use areas for WGF and VEA construction include portions of the access roads; extra work areas for distribution lines, the substation, and construction materials laydown; and concrete batch plant sites.

Once operational, depending on wind speeds and conditions, the WGF could run 24 hours per day, 365 days per year, and produce in excess of 460,000,000 kWh of energy annually. The operation would require support from approximately 10 to 20 full-time employees. The sections below discuss the following elements of the proposed project:

- Project site
- Facilities description
- Construction description
- Access and safety
- Operations and maintenance (O&M)
- Project costs
- Decommissioning
- Project design refinement

2.2.1 Facilities Description

A general description of how a WGF is developed and electrical power is generated by WTGs will facilitate an understanding of the topics discussed in this DEIS. This section will familiarize readers with the basic concepts and terminology.

The conceptual design of a WGF is based on wind-speed studies, aerodynamics, and state-of-the-art wind WTG design, with equipment and systems to make it safe, efficient, and reliable. WTGs are often grouped into a single WGF to generate bulk electrical power. Electricity from these WTGs is fed into the local utility grid and distributed to customers just as with conventional power plants. Determining the feasibility of a WGF at a particular location begins with the development of a wind atlas, which is an analytical amalgam of meteorological data, such as estimates of the annual mean wind speed of an area; topographic conditions, both natural and manmade; and other considerations, such as existing or needed distribution systems, proximity,

and economics. The type and layout of the WTGs is calculated using the site-specific data generated in the atlas, resulting in a WTG configuration that generates electricity as cost effectively as possible throughout the life of the site.

Investigations into a potential wind-generating facility in southern Nevada began as early as 1986 by the Desert Research Institute at the University of Nevada, Las Vegas. Detailed wind-speed data were gathered specifically for the Table Mountain project area with an array of anemometers. The conclusion of these studies was that the proposed site was ideal for a WGF. The site is characterized by high elevations, is adjacent to steep-sided ridges, and has wind speeds of sufficient velocity and duration to make a wind generation facility an economical prospect.

Modern WTGs fall into two basic groups: the horizontal-axis variety, such as the traditional farm windmills used for pumping water, and the vertical-axis design, such as the eggbeater-style Darrieus model, named after its French inventor. They may be designed with either synchronous or asynchronous generators and with various forms of direct or indirect grid connection. Direct grid connection means the generator is connected directly to the (usually three-phase) alternating current grid. Indirect grid connection means the current from the turbine passes through a series of electric devices that adjust the current to match that of the grid. With an asynchronous generator, adjustment occurs automatically. The WTGs to be installed under the Proposed Action are of the asynchronous type.

Electricity is generated when the rotor of a WTG, composed of three blades made of laminated fiberglass or wood, is spun by wind passing over and creating lift on the blades. A yaw system controls the directional orientation of the rotor, maintaining an accurate upwind position. The yaw system is aided by the pitch actuator/position sensor, which ensures the rotor blades are positioned according to wind speed/direction, maximizing operation. The gearbox transmits the rotor power to the generator, which produces 600-volt (V) power. This variable-frequency power is then routed to a pad-mount transformer located at the base of the tower. Voltage would be stepped up to typically 34.5-kV and transferred via underground and overhead collection lines to a substation, where the voltage would again be stepped up for delivery to the 230-kV utility transmission lines.

In addition to power generation, collection, and transmission facilities, the WGF would be equipped with a communications system that would control and monitor WGF functions. Fiber-optic communication lines would be located in a common trench or on poles with power collection lines. The WGF would be designed for year-round operation. Figure 2-2 (p. 2-6) presents the WGF layout for the Proposed Action, which is detailed in the subsections below:

- Wind Turbine Generators
- Meteorological Towers
- Electrical System Collection and Distribution
- Electric Substation
- Communications System
- Road Access

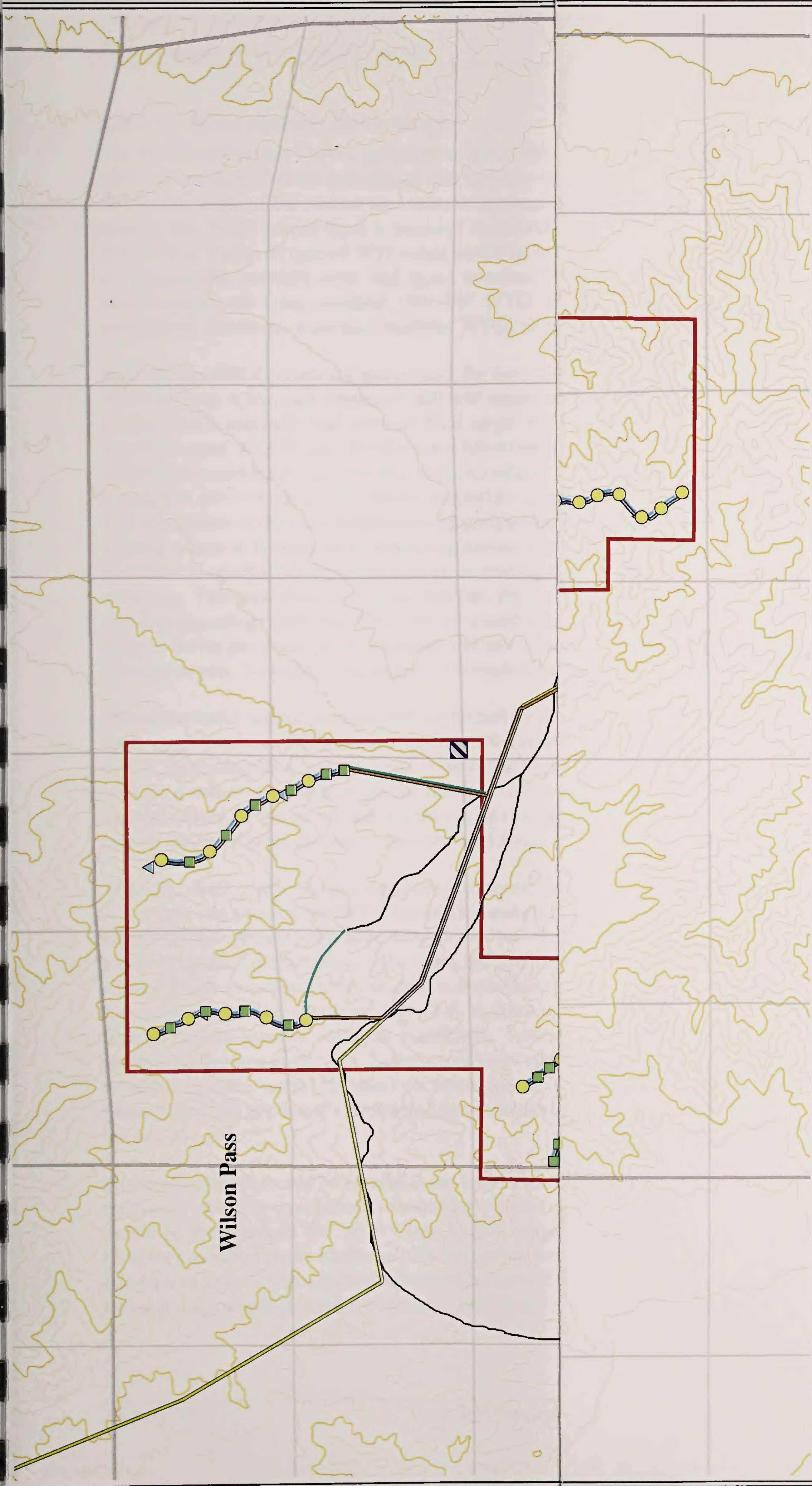

Table Mountain Wind Generating Facility

Legend

- 900-kW WTG
- 1,500-kW WTG
- Meteorological Towers
- Proposed 34.5-kV OH Distribution Line
- Proposed 34.5-kV Underground Collection Line
- Existing Valley Electric 230-kV Line
- Existing Roads - Improve to 30' wide
- Existing Roads - Improve to 20' wide
- New Road Construction - 20' wide
- New Road Construction - 30' wide
- Proposed Laydown Area/Batch Plant
- Proposed Substation
- Table Mountain Project Area
- 50-Meter Contours
- 200-Meter Index Contours

N

Miles
0 0.25 0.5 1

Figure 2-2
Proposed Action Facilities Site Plan

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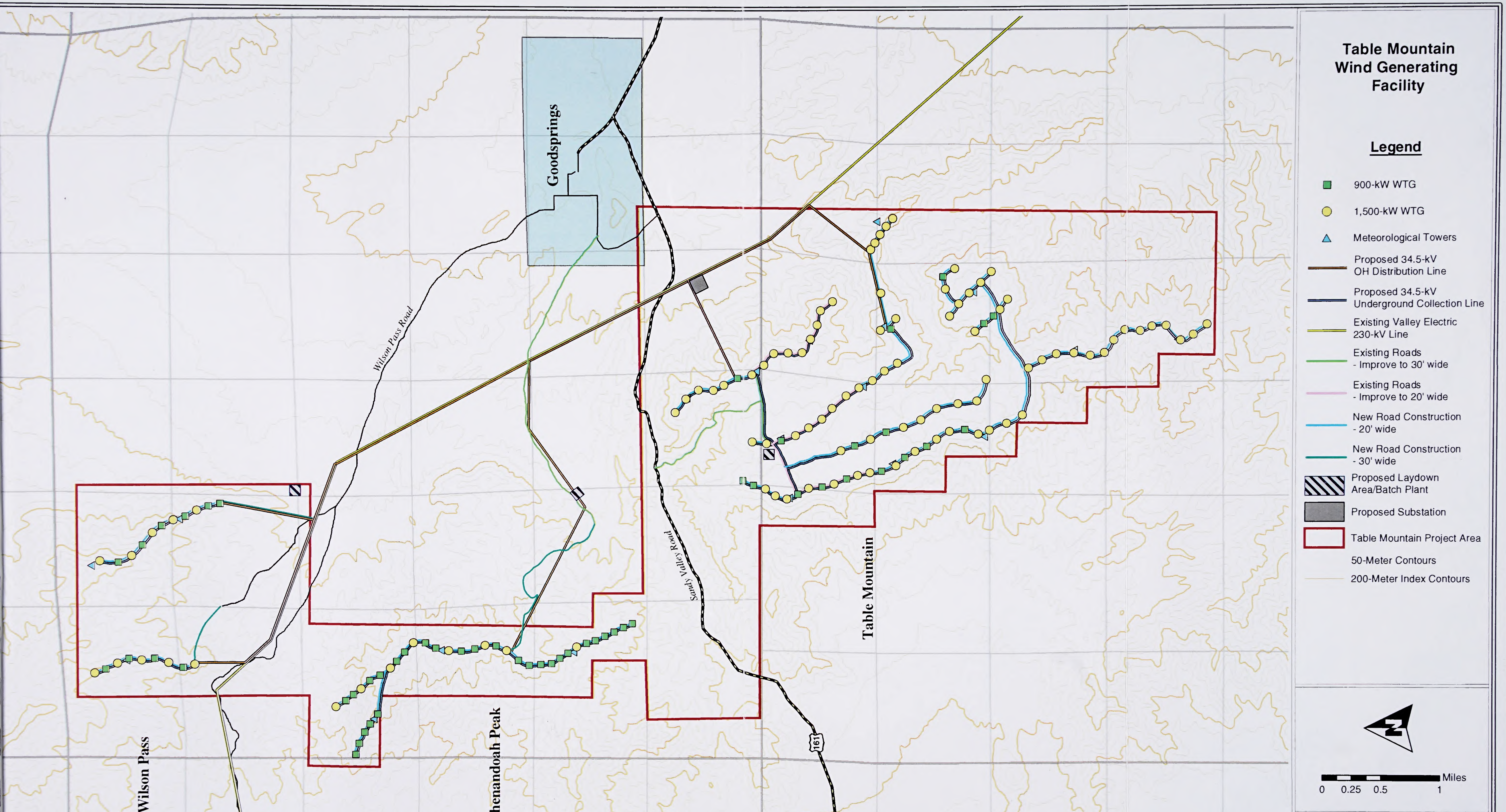

Figure 2-2
Proposed Action
Facilities Site Plan

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2.2.1.1 Wind Turbine Generators

The WTG models that TMWC proposes to install throughout the project area employ a three-bladed, upwind, stall-regulated, horizontal-axis design and variable-speed turbine (i.e., the rotor always faces upwind). These WTGs are some of the newest and most technologically advanced models available. Under the Proposed Action, the WGF would have a nominal electrical capacity of 191-MW and consist of approximately 153 WTGs. The two types of WTGs that would be installed under the Proposed Action are the NEG Micon (or comparable manufacturer and type) nominal 900-kW WTG and the NEG Micon (or comparable manufacturer and type) nominal 1500-kW WTG (Figure 2-3, p. 2-8). The technical specifications and operational functions associated with the WTGs to be used are discussed below.

NEG Micon 900. Operational parameters for the NEG Micon 900 (or comparable manufacturer and type) WTG include a nominal output of 900 kW (rated at approximately 800 kW for the site), which can be generated at a nominal wind speed of 35.8 mi per hour (mph). The cut-in wind speed is 7.8 mph with a cut-out wind speed of 55.9 mph. Wind creates lift on the three wood laminated blades, which comprise the 180-ft diameter upwind rotor, causing the blades to rotate. The blades have a rating of 22 revolutions per minute (rpm). The pitch of the blades can be changed to cope with changing air densities and blade contamination. The orientation of the rotor blades and the maintenance of accurate upwind position is controlled by the yaw system, which is comprised of a bearing surface for directional rotation of the turbine, a drive system to maintain an upwind rotor position, an error sensing system, and a mechanical brake for use during system servicing. This yaw control system prevents the turning yaw from twisting cables within the WTG and causing operating problems. This system would employ a yaw gear with a friction brake disk and three electric-driver planetary gears. Bearings and yaw control gears would be greased, and hydraulic oil would be checked as part of routine maintenance. Five gal of hydraulic oil per WTG would be renewed every 5 years.

The rotor blades are connected to the main shaft by the hub. Rotor power is transmitted to the generator by a three-stage gearbox. The generator operates at a synchronous speed (1,800 rpm) with a nominal voltage of 600 V, operating on a water-cooled system that includes a radiator to dissipate heat. The radiator would contain a water and ethylene glycol mixture that would be tested annually. The gearbox would contain approximately 34 gal of oil that would not be routinely renewed. The gearbox is an essentially leakproof system designed with gaskets to prevent fluid loss.

The rotor shaft, gears, and generator are positioned in a straight line through the nacelle, which is the housing of the unit and protects the WTG mechanics and electronics from environmental exposure. This alignment allows for operational loads to be transferred from the bearings and the gearbox to the nacelle and the tower, ensuring optimal exploitation of the wind, the best possible power transfer, and minimal wear. The nacelle is affixed to a freestanding, painted-steel, conical (tubular)-type tower measuring 160 to 235 ft high. The tower foundation would be approximately 15 ft in diameter and 30 ft in depth, although the final design would depend on site-specific soil/rock conditions. Towers would be painted with a nonreflective finish that provides corrosion protection. Selection of paint type would be based on site-specific corrosion problems; selection of color would be based on numerous factors, including, but not limited to, mitigation of visual impacts. Access to control systems and for maintenance work would be through a locked door in the base of the tower.

Power electronics would be located at the base of the tower and would convert the wind-generated variable-frequency power to synchronous frequency power for delivery to the utility system. Lightening protection would be the standard IEC 1024 Class 1, with a lightening rod mounted in the top of the nacelle and the receptors installed in the blade tips. The sensor system would employ RPM sensors for the rotor, generator, and yaw system. Temperature sensors would be used for the gear, generator, and controller. Thermal sensors and warnings would be used for the main switch and for engine protection. Vibration sensors would be used

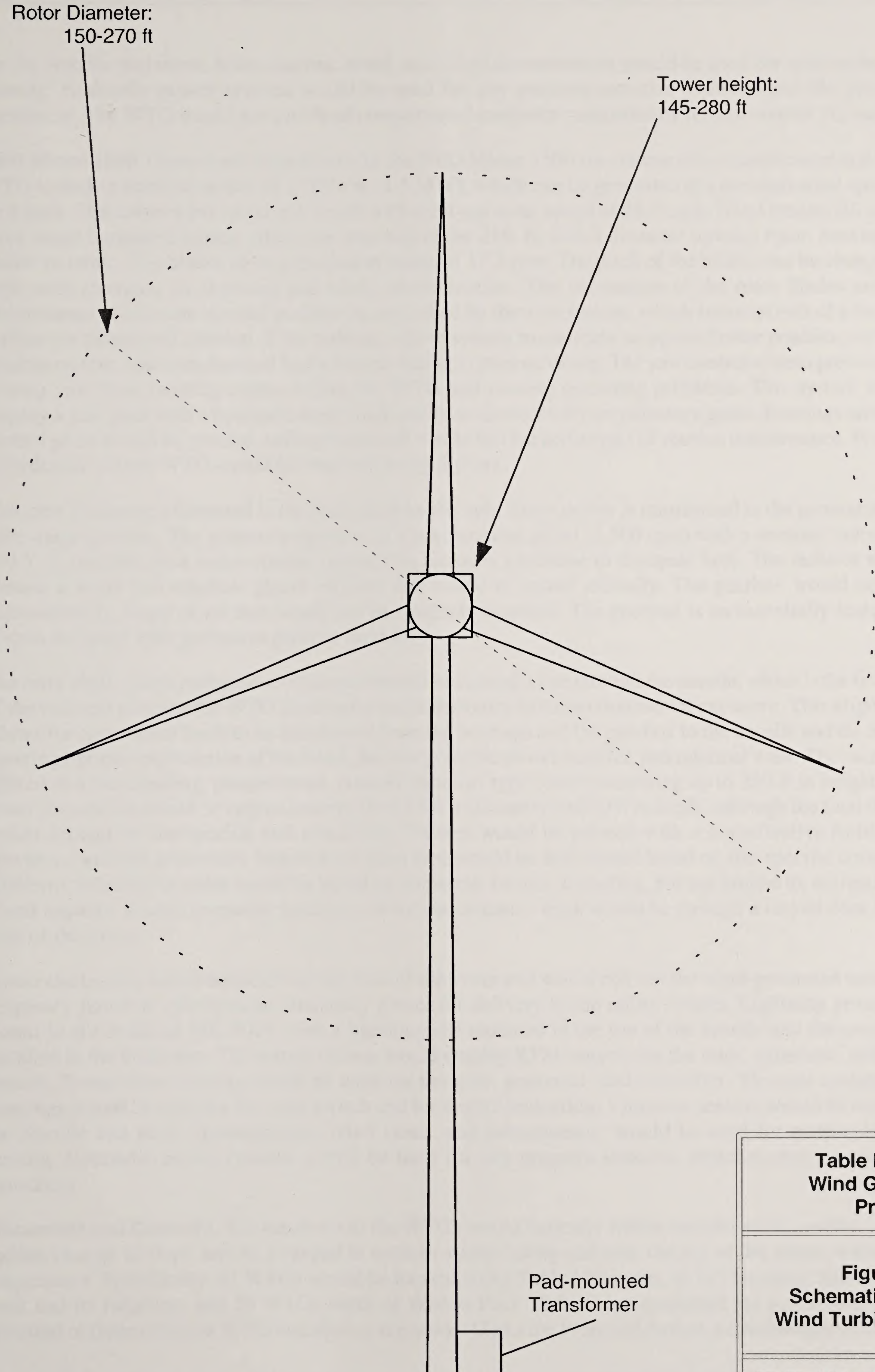

Table Mountain Wind Generating Project

Figure 2-3
Schematic of Typical Wind Turbine Generator

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for the Nacelle and rotor. Anemometers, wind vanes, and thermometers would be used for meteorological sensing. Hydraulic power systems would be used for any pressure-sensitive switches and the pressure transducer. The WTG would use a no-load compensated computer controlled by remote control via modem.

NEG Micon 1500. Operational parameters for the NEG Micon 1500 (or comparable manufacturer and type) WTG include a nominal output of 1,500 kW (1.5 MW), which can be generated at a nominal wind speed of 35.8 mph. The cut-in wind speed is 8.9 mph with a cut-out wind speed of 55.9 mph. Wind creates lift on the three wood laminated blades, which are attached to the 236- to 269-ft diameter upwind rotor, causing the blades to rotate. The blades have a revolution rating of 17.3 rpm. The pitch of the blades can be changed to cope with changing air densities and blade contamination. The orientation of the rotor blades and the maintenance of accurate upwind position is controlled by the yaw system, which is comprised of a bearing surface for directional rotation of the turbine, a drive system to maintain an upwind rotor position, an error sensing system, and a mechanical brake for use during system servicing. The yaw control system prevents the turning yaw from twisting cables within the WTG and causing operating problems. This system would employ a yaw gear with a hydraulic brake disk and five electrical-driver planetary gears. Bearings and yaw control gears would be greased, and hydraulic oil would be checked as part of routine maintenance. Five gal of hydraulic oil per WTG would be renewed every 5 years.

The rotor blades are connected to the main shaft by the hub. Rotor power is transmitted to the generator by a three-stage gearbox. The generator operates at a synchronous speed (1,800 rpm) with a nominal voltage of 690 V. It operates on a water-cooled system that includes a radiator to dissipate heat. The radiator would contain a water and ethylene glycol mixture that would be tested annually. The gearbox would contain approximately 34 gal of oil that would not be routinely renewed. The gearbox is an essentially leakproof system designed with gaskets to prevent fluid loss.

The rotor shaft, gears, and generator are positioned in a straight line through the nacelle, which is the housing of the unit and protects the WTG mechanics and electronics from environmental exposure. This alignment allows for operational loads to be transferred from the bearings and the gearbox to the nacelle and the tower, ensuring optimal exploitation of the wind, the best possible power transfer, and minimal wear. The nacelle is affixed to a freestanding, painted-steel, conical (tubular)-type tower measuring up to 280 ft in height. The tower foundation would be approximately 18 to 23 ft in diameter and 30 ft in depth, although the final design would depend on site-specific soil conditions. Towers would be painted with a nonreflective finish that provides corrosion protection. Selection of paint type would be determined based on site-specific corrosion problems; selection of color would be based on numerous factors, including, but not limited to, mitigation of visual impacts. Access to control systems and for maintenance work would be through a locked door in the base of the tower.

Power electronics would be located at the base of the tower and would convert the wind-generated variable-frequency power to synchronous frequency power for delivery to the utility system. Lightning protection would be the standard IEC 1024, with a lightning rod mounted in the top of the nacelle and the receptors installed in the blade tips. The sensor system would employ RPM sensors for the rotor, generator, and yaw system. Temperature sensors would be used for the gear, generator, and controller. Thermal sensors and warnings would be used for the main switch and for engine protection. Vibration sensors would be used for the Nacelle and rotor. Anemometers, wind vanes, and thermometers would be used for meteorological sensing. Hydraulic power systems would be used for any pressure sensitive switches and the pressure transducer.

Placement and Capacity. The locations of the WTGs would basically follow the elevation contours near a sudden change in slope and be arranged in rows or strings along and near the top of the ridges within the project area. Specifically, 97 WTGs would be located along Table Mountain, 36 WTGs along Shenandoah Peak and its ridgeline, and 20 WTGs north of Wilson Pass. TMWC has evaluated the power-generating potential of three different WTG installation scenarios. Under the Proposed Action, a combination of the two

WTG models would be employed: 55 NEG Micon 900 (or comparable manufacturer and type) units and 98 NEG Micon 1500 (or comparable manufacturer and type) units for a total of 153 WTGs with a nominal capacity of 191 MW (Figure 2-2, p. 2-6). Alternative A would involve the installation of 187 NEG Micon 900 (or comparable manufacturer and type) with a nominal capacity of 150 MW (Figure 2-4, p. 2-11). Under Alternative B, 135 NEG Micon 1500 (or comparable manufacturer and type) WTGs with a nominal capacity of 205 MW would be installed (Figure 2-5, p. 2-12). Table 2-1 (p. 2-10) illustrates the locations, the approximate number of WTGs, and the power capacity for the Table Mountain WGF as defined in the Proposed Action and the alternatives.

WTG corridors would be approximately 200 ft wide during construction and be reduced to 70 ft in width for the life-of-project (LOP). To avoid blocking the wind and/or to minimize air turbulence from neighboring machines, WTGs would be placed roughly two to three rotor diameters, or a minimum of 500 ft, apart from each other and aligned in parallel strings with a minimum distance of 1,200 ft between each string. The strings would be positioned perpendicular to the prevailing wind direction. This orientation, with respect to the terrain, minimizes the reduction of wind velocity due to ground effects.

2.2.1.2 Meteorological Towers

Approximately 14 meteorological towers would be installed throughout the project area prior to WTG construction. Meteorological towers, or anemometers, record the weather data necessary to determine the most efficient operational strategy for the WTGs arrays. The data collected includes wind speed and direction, temperature, humidity, barometric pressure, and rainfall.

2.2.1.3 Electrical Collection and Distribution System

Power produced by the WTGs would be fed downtower via three-phase 600-V underground cables to pad-mounted electrical transformers that raise the voltage to distribution levels (34.5 kV) plus or minus approximately 15 kV. The transformers would be located near the base of each tower and encompass an area approximately 8 square-feet (ft^2). Figure 2-6 (p. 2-13) is a diagram of a typical pad-mounted transformer and buried low-voltage cable. Each array of WTGs would be interconnected through the underground cables and connected to a riser that would link the underground system to an overhead 34.5-kV electric distribution line. The overhead distribution system would be constructed on single-pole or H-frame wooden structures with single- and double-circuit 34.5-kV conductors (Figure 2-7, p. 2-14). The distance between structures would average 500 ft, but maximum spans of 700 ft may be possible under optimum terrain conditions. The overhead distribution system would be constructed in conformance to the National Electric Safety Code (NESC), the American National Standards Institute, and *Suggested Practices for Raptor Protection on Power Lines–The State of the Art in 1981* (Olendorff et al. 1996) or any future updated versions.

Table 2-1. Placement and Capacity of Wind Turbine Generators.

Scenario	WTG Model	Location: Table Mountain	Location: Shenandoah Peak	Location: Wilson Pass	Total WTGs	Nominal Capacity[a] (MW)
Proposed Action	NEG Micon 900	17	28	10	55	
	NEG Micon 1500	80	8	10	98	
	TOTAL	97	36	20	153	191
Alternative A	NEG Micon 900	126	37	24	187	150
Alternative B	NEG Micon 1500	91	27	17	135	205

a. Assumes use of NEG Micon 900 and 1500 WTGs (or comparable manufacturer and type).

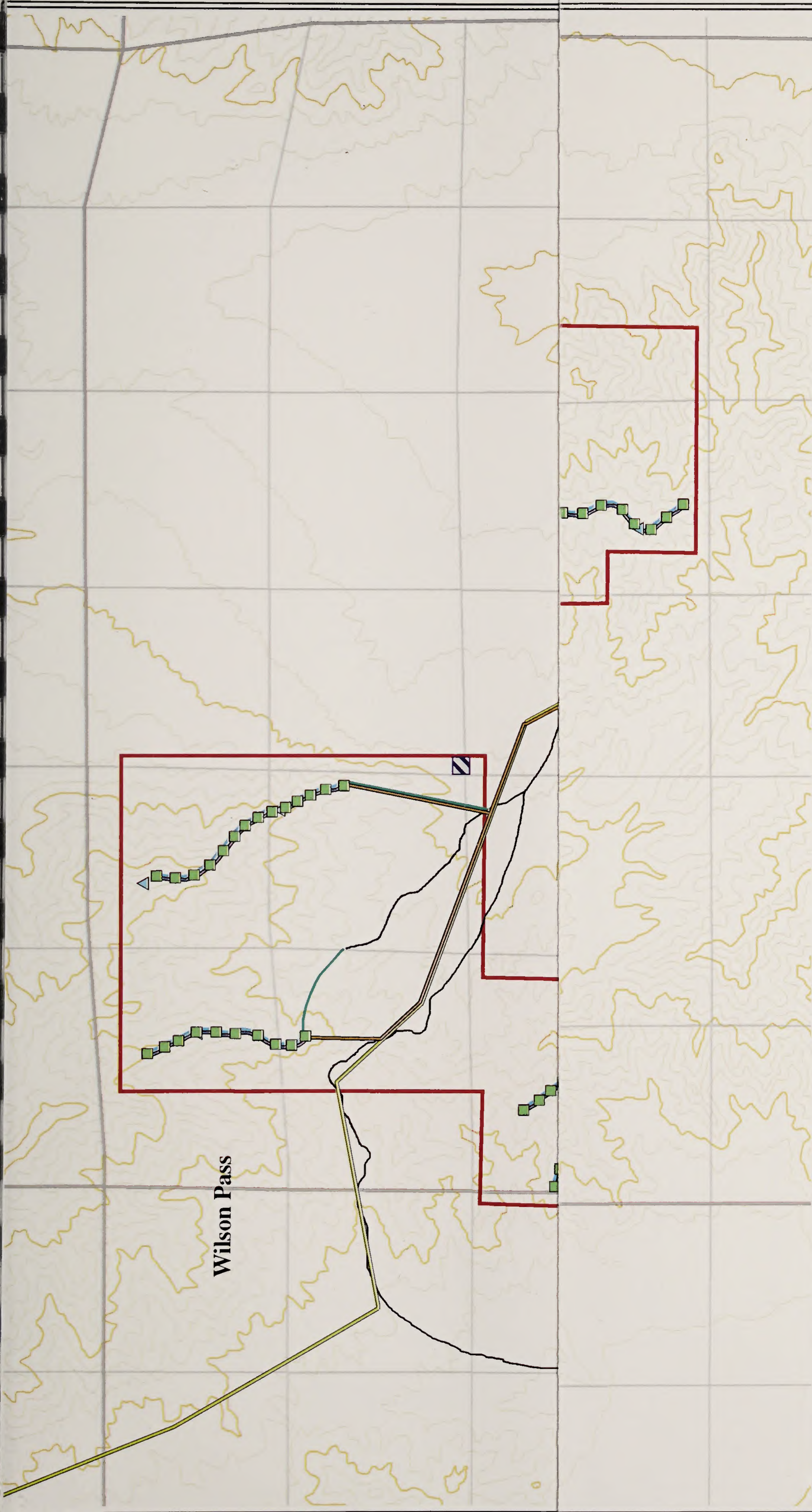

Table Mountain Wind Generating Facility

Legend

- 900-kW WTG
- Meteorological Towers
- Proposed 34.5-kV OH Distribution Line
- Proposed 34.5-kV Underground Collection Line
- Existing Valley Electric 230-kV Line
- Existing Roads - Improve to 30' wide
- Existing Roads - Improve to 20' wide
- New Road Construction - 20' wide
- New Road Construction - 30' wide
- Proposed Laydown Area/Batch Plant
- Proposed Substation
- Table Mountain Project Area
- 50-Meter Contours
- 200-Meter Index Contours

N

Miles
0 0.25 0.5 1

Figure 2-4
Alternative A
Facilities Site Plan

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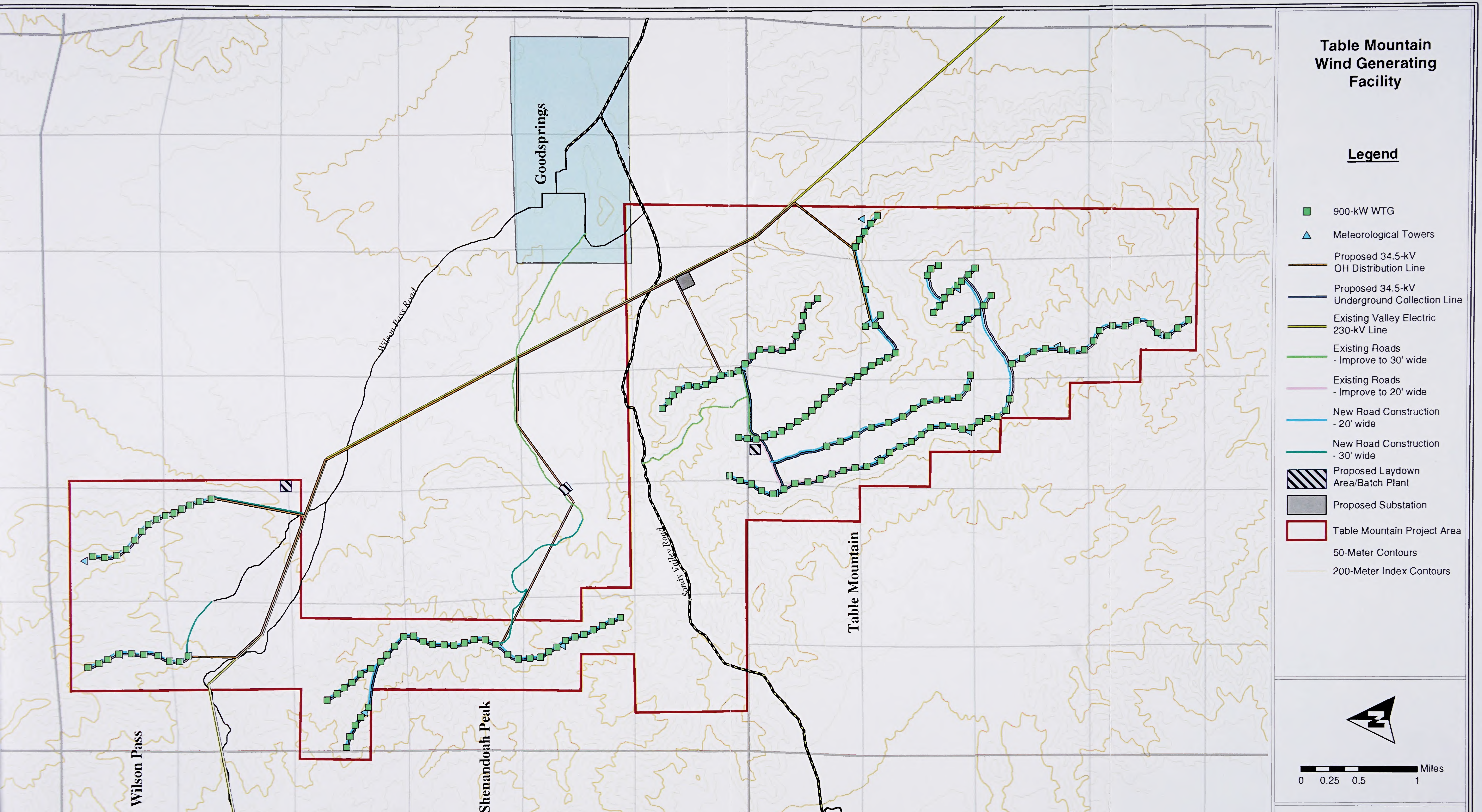

Figure 2-4
Alternative A
Facilities Site Plan

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Table Mountain Wind Generating Facility

Legend

- 1,500-kW WTG
- Meteorological Towers
- Proposed 34.5-kV OH Distribution Line
- Proposed 34.5-kV Underground Collection Line
- Existing Valley Electric 230-kV Line
- Existing Roads - Improve to 30' wide
- Existing Roads - Improve to 20' wide
- New Road Construction - 20' wide
- New Road Construction - 30' wide
- Proposed Laydown Area/Batch Plant
- Proposed Substation
- Table Mountain Project Area
- 50 Meter Contours
- 200 Meter Index Contours

N

Miles
0 0.25 0.5 1

Figure 2-5
Alternative B
Facilities Site Plan

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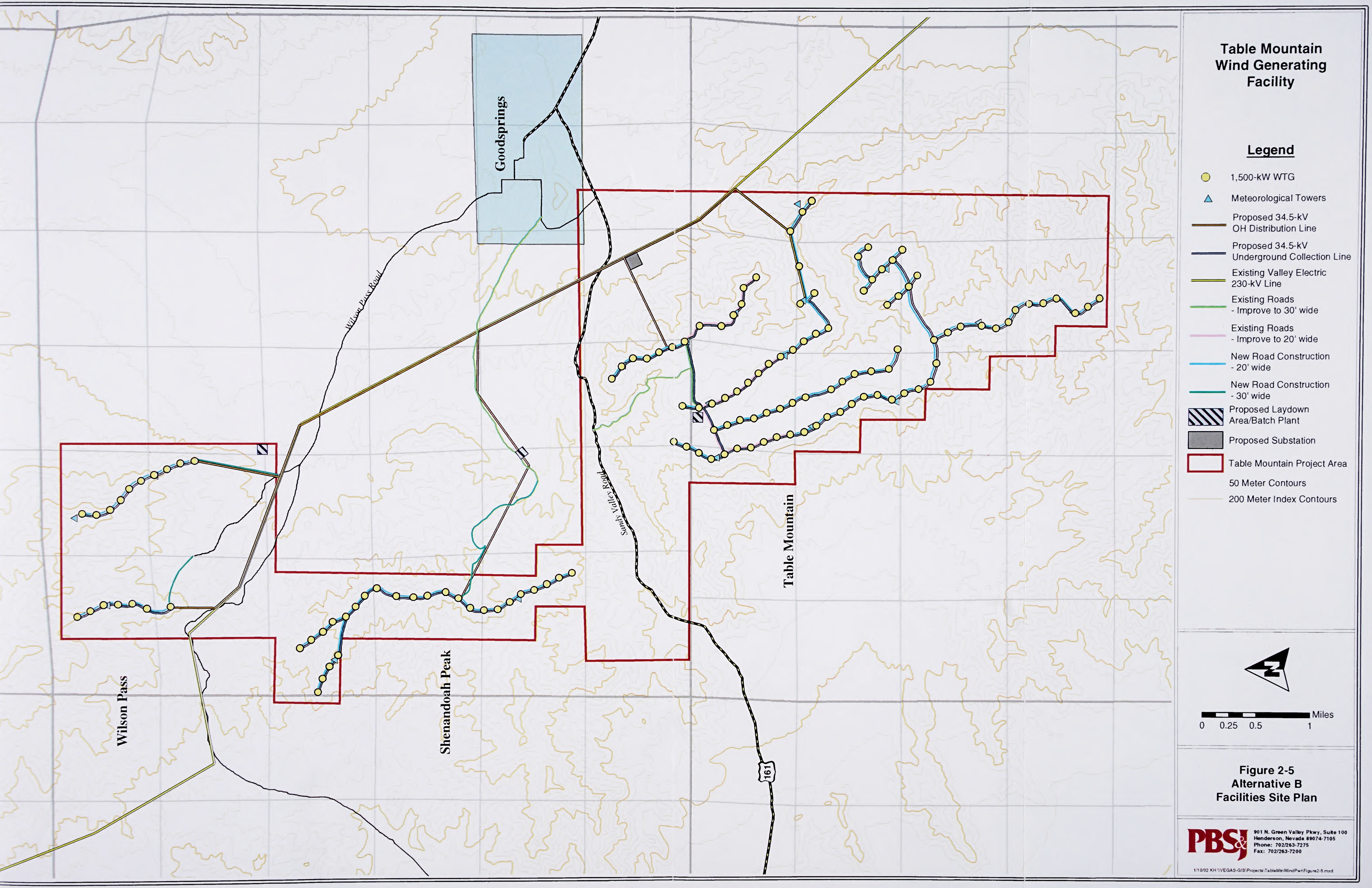
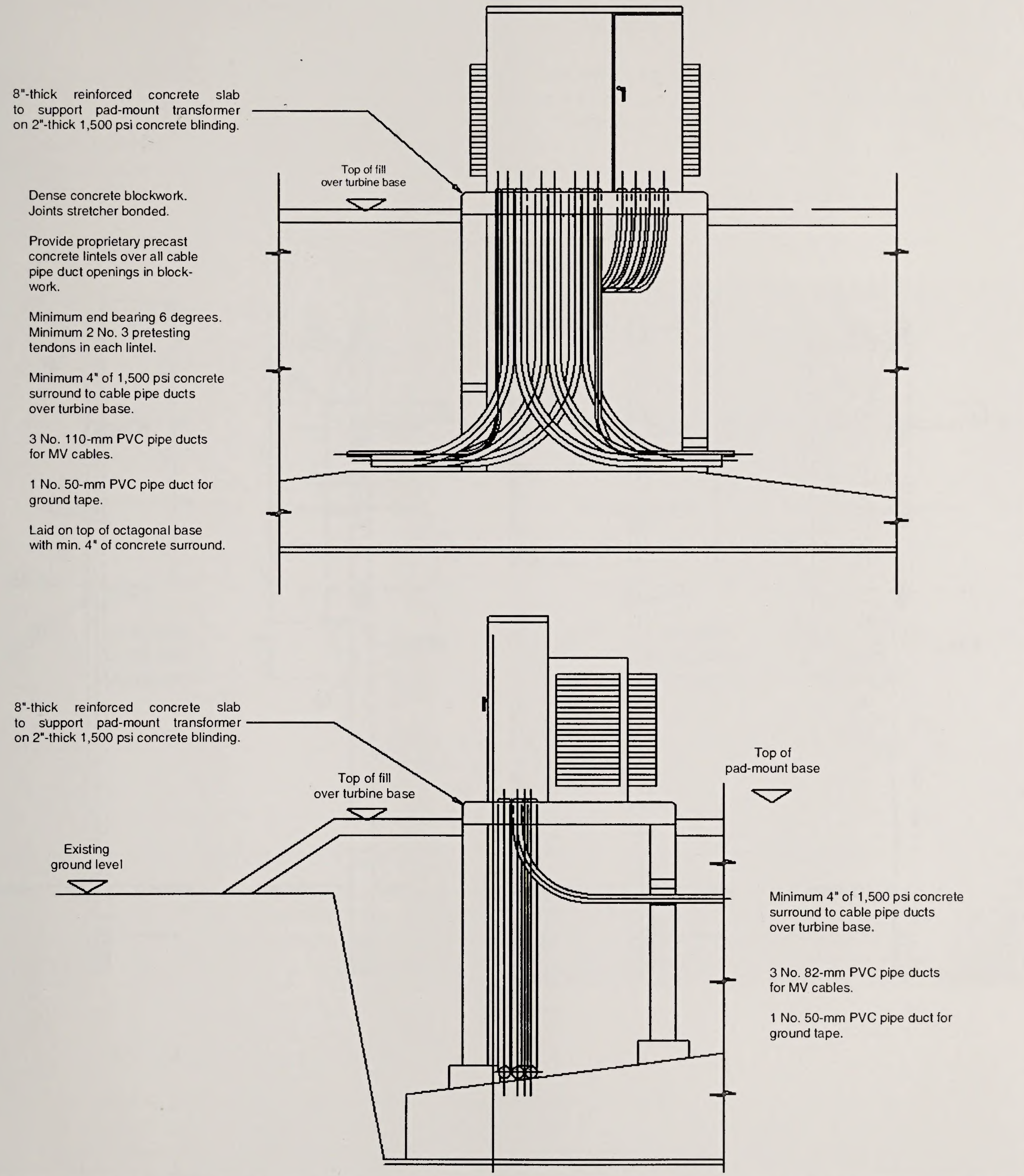


Figure 2-5
Alternative B
Facilities Site Plan



Source: Oceans Engineering Limited

Table Mountain Wind Generating Facility

Figure 2-6
Typical Pad-Mounted Transformer and Underground Cables

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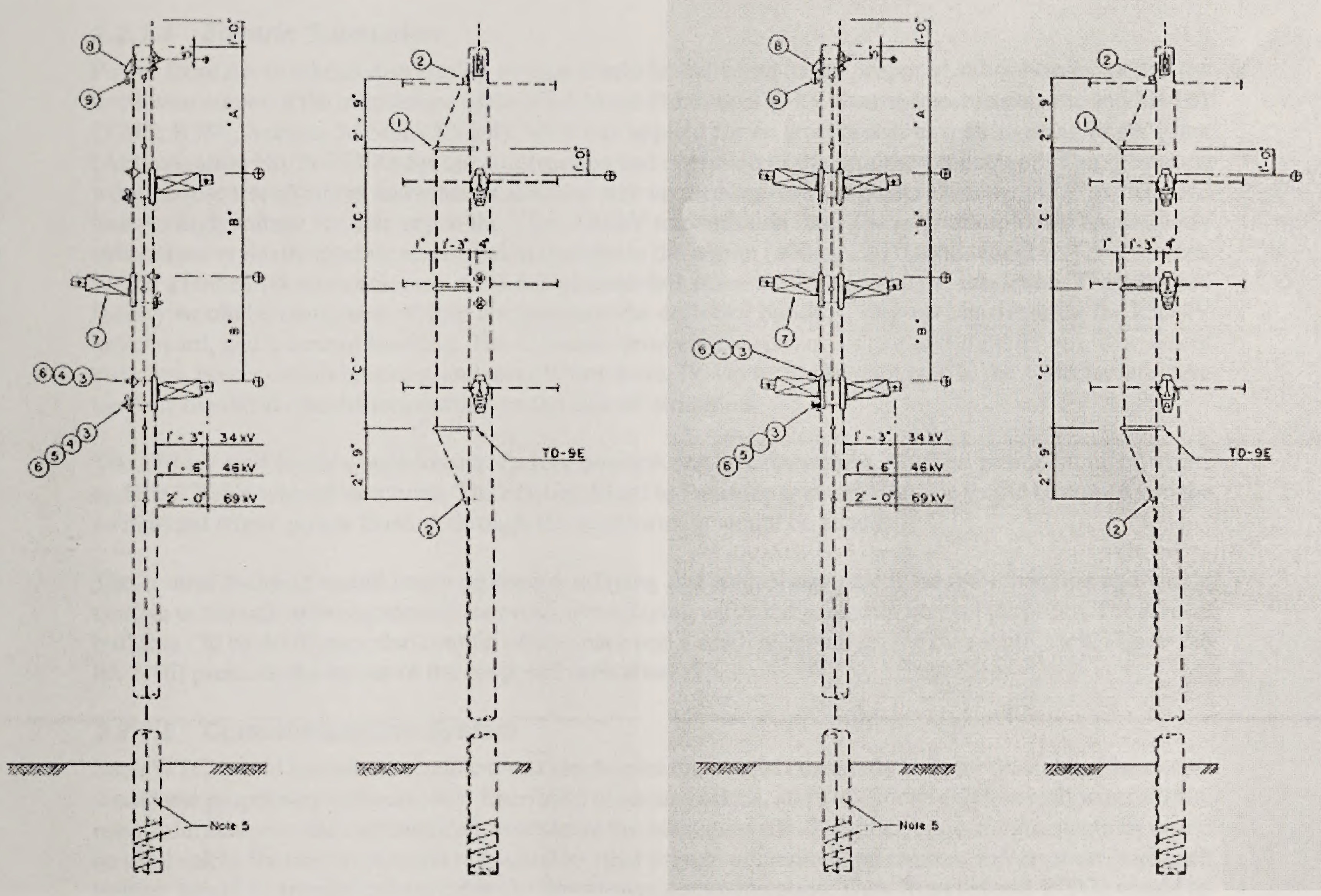

Source: VEA

Table Mountain Wind Generating Facility

Figure 2-7
Typical 34.5-kV
Electric Distribution Line
Structure

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Approximately 13 mi of 34.5-kV overhead distribution lines would be constructed to connect the three segments of the project to the proposed substation. The proposed distribution line would be constructed within a 100-ft temporary ROW that would be reduced to a 60-ft permanent ROW after construction. It would parallel roads and the existing utility corridor where possible. Approximately 7 mi of the overhead distribution system would be located within the VEA Mead-Pahrump 230-kV transmission line ROW, and approximately 4.0 mi of proposed overhead distribution lines would parallel existing and proposed roads. The remaining 2.1 mi of the distribution line would be constructed in areas not associated with existing ROWs. Approximately 160 ac would potentially be temporarily disturbed during the installation of the overhead power distribution line system. Permanent disturbance would be 96 ac.

2.2.1.4 Electric Substation

Power from the overhead distribution system would be delivered to the proposed substation located at the southwest corner of the intersection of the VEA Mead-Pahrump 230-kV electric transmission line and SH 161 (T24S, R58E, Section 34 SE1/4NE1/4). VEA has applied for an amendment to their existing ROW grant (Authorization No. N-57100) for the construction and operation of the proposed substation. The substation would house transformers and other facilities to step up medium-voltage power from the WGF distribution lines to high voltage for delivery to the VEA 230-kV transmission line. The substation would be similar to substations typically used on transmission systems in the region (300 by 220 ft) and would be 1.5 ac in size, within a fenced 10-acre enclosure. A 10-ft-high chainlink fence would surround the substation. The proposed facility would be comprised of four components: the collector building, step-up transformers, the 230-kV switchyard, and a control building. The collector structure consists of a main-and-transfer bus, disconnect switches, power circuit breakers, and takeoff structures. Power would be delivered to the collector structure via four overhead circuits terminating on the takeoff structures

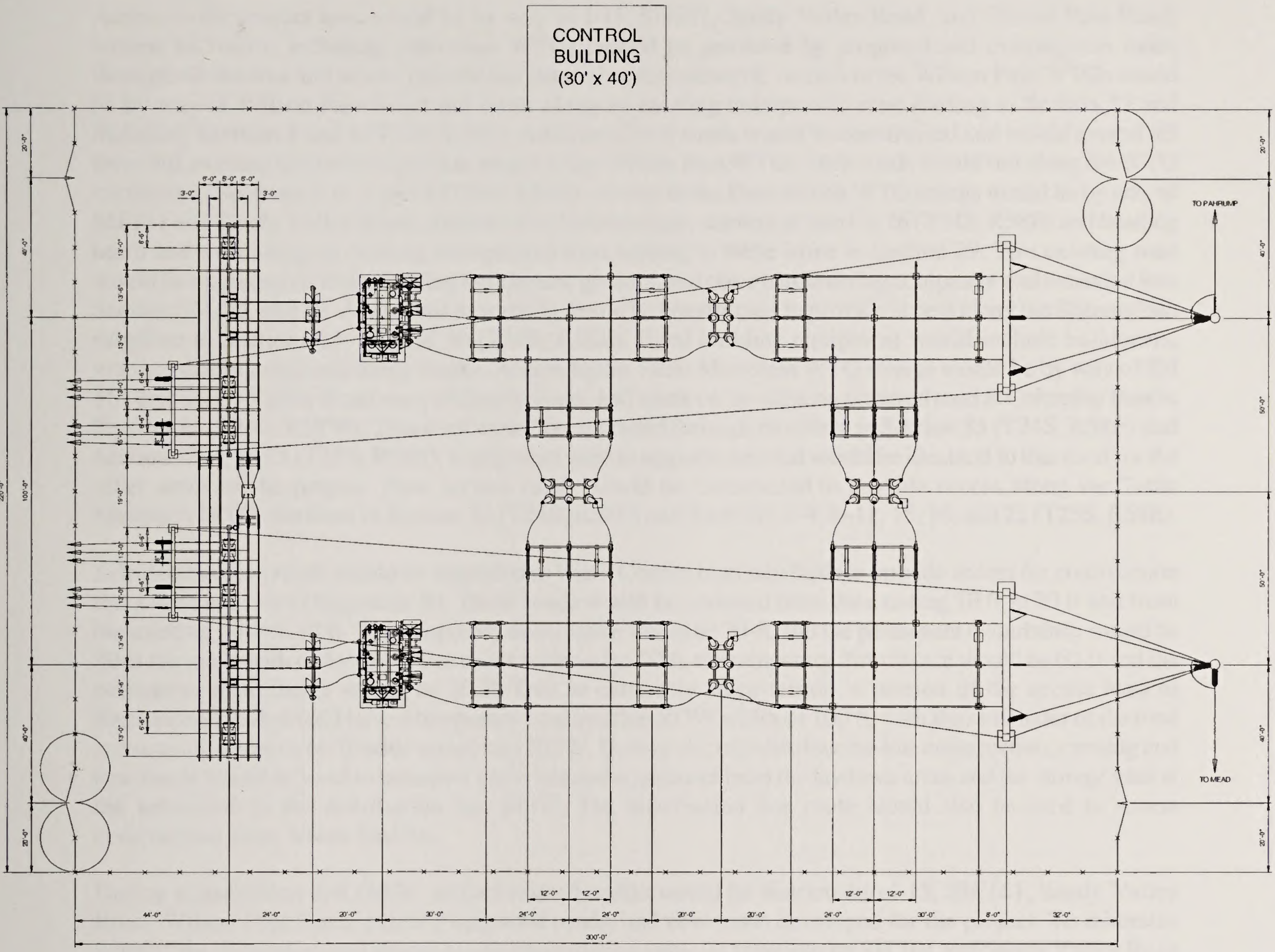
The 230-kV switchyard would consist of a four-position ring bus, disconnect switches, power circuit breakers, and the 230-kV takeoff structures. The existing Mead to Pahrump transmission line would be tapped into the switchyard where power flowing through the transformers would be added.

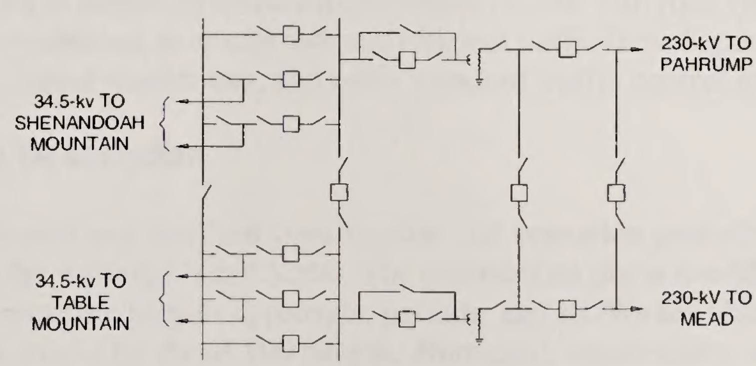
The control building would house protective relaying and control equipment for the substation and would contain communication equipment for protective relaying and wind generator control purposes. The control building (30 by 40 ft) may also contain office space and a small restroom served by a septic tank. Figure 2-8 (p. 2-16) presents the layout of the proposed substation.

2.2.1.5 Communications System

Each WTG would contain communications electronics that would constantly monitor functions. The system would use proprietary software, new fiber-optic communications, and a telephone communication network to relay information to the communication center at the substation site. The fiber-optic communications would be used solely for this project and not sublet to other private or commercial entities. Information from each turbine would be transferred via cables to downtower communication. Data from several WTGs would be transmitted via underground cables to data collection equipment, where the cables would connect to the riser poles used for electrical collection lines. Underground communication cables would be buried in the same trenches used for power collection lines.

Similarly, overhead communications lines would be installed primarily on the structures used for overhead distribution lines. Overhead communications lines would be routed to a central location at the proposed substation site. One communications control building would be needed for the project and would be located within the confines of the substation site.





Switching Diagram

Source: VEA

Table Mountain Wind Generating Facility

Figure 2-8
Proposed Substation Layout

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2.2.1.6 Road Access

Access to the project area would be by way of I-15, SH161, Sandy Valley Road, and Wilson Pass Road. Access to WGFs, including individual WTGs, would be provided by proposed and existing dirt roads throughout the area and would provide the internal access network. Access to the Wilson Pass WTGs would be by way of Wilson Pass Road and north along an existing unimproved road starting in Section 17 and including Sections 8 and 5 (T24S, R58E). Additional new roads would be constructed and would extend off from this existing dirt road to provide access to the Wilson Pass WTGs. New roads would run along the WTG corridors in Sections 5, 6, 7, and 8 (T24S, R58E). Access to the Shenandoah WTG strings would be by way of SH 161 and Sandy Valley Road, southwest of Goodsprings, starting at Section 26 (T24S, R58E) and heading north and west along an existing unimproved road leading to Belle Mine in Section 29. This existing road would be upgraded (widened) using bulldozers, graders, and other earthmoving equipment and extended into Sections 29, 30, and 19. Additional new roads would be constructed to provide access along the Shenandoah ridgeline in Sections 18, 19, and 30 (T24S, R58E). Road building equipment would include bulldozers, graders, drilling rigs, and dump trucks. Access to the Table Mountain WTG strings would be by way of SH 161 and Sandy Valley Road west of Goodsprings, and south on the existing unpaved road at Columbia Pass in Section 33 (T24S, R58W). This road would be upgraded through its extent in Section 33 (T24S, R58E) and Sections 3, 4, and 5 (T25S, R58E). Equipment used to upgrade the road would be identical to that used for the other areas of the project. New service roads would be constructed to provide access along the Table Mountain WTG corridors in Section 33 (T24S, R58E) and Sections 2–4, 9–11, 15, 16, and 22 (T25S, R58E).

Selected existing roads would be upgraded to Clark County road standards to provide access for construction and O&M activities (Appendix B). These roads would be widened from the existing 10 ft to 20 ft and from the existing 10 ft to 30 ft. The temporary disturbance would be 30-ft, and the permanent disturbance would be 20-ft for roads widened to 20 ft. For roads widened to 30 ft, the temporary disturbance would be 60-ft and the permanent disturbance would be 30-ft. Due to extremely steep terrain, a portion of the access road to Shenandoah Park would have a temporary construction ROW width of 100 ft, with the remainder of the road constructed within a 60-ft-wide temporary ROW. During electric-distribution-line construction, existing and new roads would be used to transport materials and equipment from the laydown areas and the storage yard at the substation to the distribution line ROW. The distribution line route would also be used to access construction sites, where feasible.

During construction and O&M, project-related traffic would be restricted to I-15, SH 161, Sandy Valley Road, Wilson Pass Road, existing upgraded roads, and new roads developed for the project. To minimize impacts on commuters and school buses, construction vehicles traveling on SH 161 and Sandy Valley Road would be limited during the morning and late afternoon commute time. TMWC would instruct project personnel and contractors to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, to ensure safe and efficient traffic flow. Signs would be placed along roads to identify speed limits, travel restrictions, and other standard traffic control information.

2.2.2 Construction Description

The proposed project would use standard construction and operation procedures as used for other WGF development projects in the western United States. The construction phase would last approximately 8 months and start as soon as the requisite project approvals, permits, and ROWs are obtained. It is estimated that the peak construction crew would be about 100 people. Normally, construction would occur during daylight hours; however, some activities would require extended operation hours due to scheduling constraints, to maintain structural integrity of concrete pours, or due to other time-sensitive matters. Night construction may occur, if necessary, to meet the overall project schedule.

Heavy equipment would be needed to clear the sites, build roads and WTG pads, haul and lift materials, and pull power line. Once roads were opened and foundations built, cranes and trucks would move in to haul and

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lift the parts into position for assembly. Parts and equipment would be hauled by truck to each of the three construction-materials laydown areas and the proposed substation. Heliporting equipment and materials to more remote, rugged areas is not feasible due to the quantities and weights involved. Additionally, access and service roads are needed for O&M activities; therefore, road construction is required in areas of rugged terrain. Seven truckloads of parts would be required per WTG. Thus, approximately 1,050 trucks hauling WTG parts, each with a gross weight of approximately 80,000 pounds (lb), would travel to the WGF. The trucks would enter the area from I-15 at the Jean exit and proceed to the designated laydown area where a crane would unload them. Assuming a construction schedule of 8 months, an average of 4.4 trucks of parts would arrive and leave per day. Gravel, sand, and water would be hauled from local sources. Table 2-2 (p. 2-19) lists typical equipment requirements for WGF construction.

During construction, approximately 120,000 gal of water trucked in from an off-site municipal source would be used daily for dust control. Additionally, approximately 6,000 gal of water would be required to make concrete for each foundation. No wells would be drilled for the project, and all water would be hauled from a municipal source to the site. Five trucks would haul five to six loads of water each per day. Assuming 240 days for construction, the total water usage for dust control and foundation construction over this time period would be approximately 91 acre-ft of water.

During construction, a 125-kW, 186-horsepower, diesel-powered generator would produce electricity at each of the concrete batch plants. The three batch plants would be portable, operate a maximum of 16 hours per day for the duration of the construction period, and be located within each of the three laydown areas. Material storage at the batch plant would include on average 2,400 cubic yards (yd^3) of sand and 1,600 yd^3 of aggregate, which is enough material to pour 20 WTG foundations.

Each laydown site, including batch plants, would require approximately 5 ac (for a total of 15 ac), which would be reduced to 2 ac for each location (for a total of 6 ac) after the construction period and through the LOP. The temporary 5-ac sites would be used during construction as storage for equipment and facility construction materials, vehicle parking, waste disposal and collection receptacles, and temporary modular office space. The permanent 2-ac sites would be used through the LOP as heavy equipment storage areas and/or staging areas during replacement of WTGs and/or associated equipment or during routine maintenance of service and/or access roads. The three laydown sites/batch plants would be located at Wilson Pass (T24S, R58E, Section 16 NW1/4NW1/4), Shenandoah Peak (T24S, R58E, Section 29 NW1/4SE1/4), and Table Mountain (T25S, R58E, Section 4 Lot 3) (Figure 2-2, page 2-6).

Disposal of construction-related and personnel-generated waste would be collected and deposited in appropriate receptacles and/or dumpsters. These receptacles would be located at the three laydown areas, and when necessary, additional waste receptacles would be placed at specific construction locations. TMWC would contract with a county-/state-approved local disposal/sanitation company for removal of construction-related and personnel-generated waste on a regular basis throughout the construction period. Cleanup crews would patrol construction sites at least once per week to remove litter.

A traffic management plan would be prepared for the WGF access roads to ensure that no hazards would result from the increased truck traffic and traffic flow would not be adversely impacted. This plan would incorporate measures such as informational signs, flagmen when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.

With minor modifications to allow for site-specific circumstances, the WGF construction and operation procedures would include the following activities, which are detailed in subsequent sections:

- Site clearing and preparation
- Road construction

Table 2-2. Equipment Requirements.

Equipment	Fuel Type	No. of Units
Excavator	Diesel	2
D-9 bulldozer	Diesel	3
D-8 bulldozer	Diesel	3
D-6 bulldozer	Diesel	3
980 front-end loader	Diesel	2
300-ton crane	Diesel	2
120-ton crane	Diesel	2
65-ton crane	Diesel	2
14-H load grader	Diesel	3
Water truck	Diesel	3
Compactor	Diesel	3
Concrete truck	Diesel	3
Dump truck	Diesel	3
Forklift	Diesel	2
Concrete pump truck	Diesel	3
Generator	Diesel	3
Pick-up truck	Gasoline	6
Welder	Electric	6
Line truck	Diesel	4
Pick-up truck	Diesel	15

- Foundation construction and tower erection
- Trenching and placement of underground utility lines
- Distribution line and communications systems construction
- Substation construction
- Final testing, final road grading, erosion control, site cleanup, and restoration.

2.2.2.1 Site Clearing and Preparation

Site clearing and preparation would require the use of heavy diesel-powered earth-moving equipment including bulldozers, scrapers, dump trucks, and front-end loaders. Site clearing and preparation would occur at all locations where facility equipment would be installed. These include the WTG ROWs, within which the WTG tower/foundations and transformers would be constructed, the underground distribution and communication lines would be installed, the meteorological towers would be erected, and the new and

upgraded service roads would be located. Additional site clearing would occur outside of the WTG corridors along the new and upgraded access road ROW, the 34.5-kV distribution line ROW, the three laydown sites, and the electric substation. These facility locations are described in terms of both temporary and permanent disturbance below.

- *WTG corridors*—20 mi-long with a maximum temporary disturbance of 200-ft in width (includes WTG foundations, crane pads, transformers, underground utility lines, and new and upgraded service roads) for a temporary disturbance of 483 ac; 20 mi of permanent WTG corridor ROW at 70-ft wide for a permanent disturbance of 170 ac. Corridors include WTG towers/foundations, underground distribution lines and communication cables, meteorological towers, and new and upgraded service road.

- *WTG towers/foundations*—153 WTGs each requiring a temporary disturbance area of 0.34 ac for construction, resulting in 52 ac of temporary disturbance within the 200-ft-wide WTG corridor; permanent disturbance would be limited to the tower foundations, pad-mounted transformers, and cleared area around each foundation. Permanent disturbance would be a 30-ft-diameter area (0.016 ac) for each WTG for a total of 2.4 ac.

- *Underground distribution and communication lines*—16.8 mi within the WTG corridor; 101.8 ac of disturbance within a 50-ft temporary ROW; 40.7 ac of disturbance within a 20-ft permanent ROW. 2.2 mi of underground distribution and communication lines outside the WTG corridor; 13.3 ac of temporary disturbance within a 50-ft temporary ROW; 5.3 ac of disturbance within a 20-ft permanent ROW.

- *Meteorological towers*—14 towers located within the WTG corridors, each with a 3-ft diameter and 180 to 230 ft in height; 0.80 ac of temporary disturbance and 0.002 ac of permanent disturbance.

- *Service Roads*—There are 20.4 mi of service roads in the project area. Approximately 3.2 mi of this total are existing roads (average 10-ft wide) that would be upgraded to 20-ft in width within a 30-ft temporary ROW and a 20-ft temporary ROW. Approximately 2.7 mi of the roads to be upgraded lie within the WTG corridor for a temporary disturbance of 6.5 ac and a permanent disturbance of 3.3 ac. One-half mile of the existing roads to be upgraded are located outside the WTG corridor and would temporarily disturb 1.2 ac and permanently disturb 0.6 ac. There would be 17.2 mi of new service roads constructed within a 30-ft temporary ROW and 20-ft permanent ROW. Of that total, 14.1 mi of new service roads lie within the WTG corridor and would temporarily disturb 62.5 ac and permanently disturb 41.7 ac. Outside the WTG corridor, 3.1 mi of new service roads would be constructed, temporarily disturbing 11.4 ac and permanently disturbing 7.5 ac.

- *Access Roads*—8.0 mi of access roads; 5.5 mi of upgraded existing access roads (increasing them to 30 ft in width); 33 ac of disturbance within a 60-ft temporary ROW; 20 ac of disturbance within a 40-ft permanent ROW. Three miles of new access roads; 28 ac of disturbance within a 60-ft and a 100-ft temporary ROW [a portion (1.5 mi) of the new access road to Shenandoah Peak traverses steep terrain and would have a 100-ft temporary ROW, while the remainder (1.5 mi) of the roads would have a 60-ft temporary ROW]; 14 ac of disturbance within a 40-ft permanent ROW. Temporary and permanent road ROWs will be minimized wherever possible.

- *Overhead 34.5-kV electric distribution line*—13.2 mi of overhead line; 160 ac of disturbance within a 100-ft temporary ROW; 96 ac of disturbance within a 60-ft permanent ROW; 7 mi of line would be constructed within the VEA 230-kV transmission line ROW; 85 ac of temporary disturbance and 51 ac of permanent disturbance.

- *Material laydown and concrete batch plant areas*—three 5-ac areas; 15 ac of temporary disturbance; 6 ac of permanent disturbance (2 ac per area).

- *Substation*—1.5 ac within an enclosed 10-ac site for the LOP.

Table 2-3 (p. 2-21) outlines the temporary and permanent land disturbance that would occur under the Proposed Action. Figure 2-9 (p. 2-22) illustrates the 200-ft WTG string corridor temporary and long-term use ROW and the ancillary facilities temporary and long-term use areas within the corridor.

2.2.2.2 Road Construction

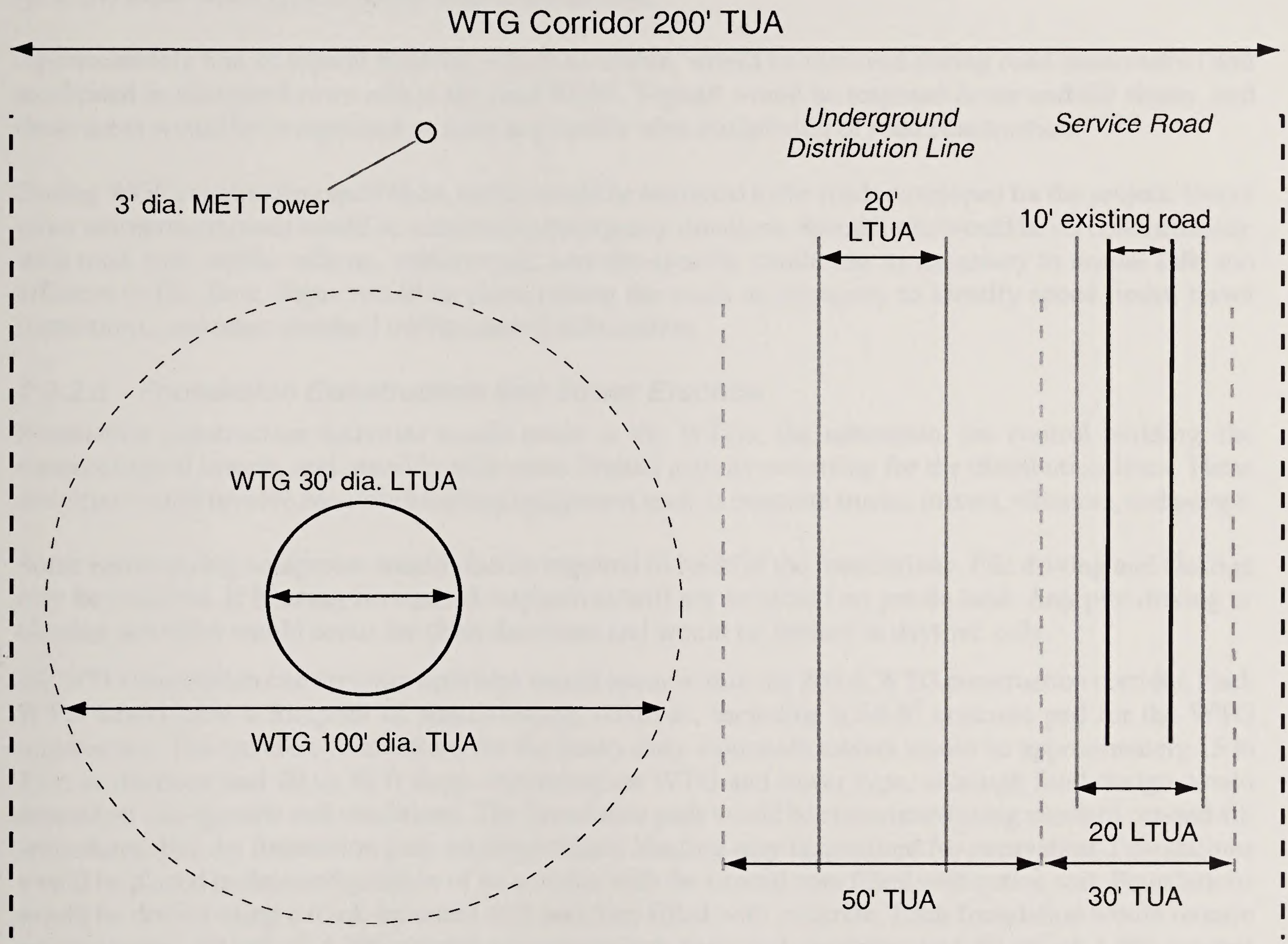
The proposed new access roads, service roads, and upgraded existing roads would be constructed and maintained according to Clark County standards to provide safe operating conditions at all times. All new access roads would be developed for the specific purpose of WGF construction and O&M.

Site-specific engineering surveys and analyses would be conducted prior to disturbance, and roads would be located and designed to minimize disturbance, avoid sensitive resources and unsuitable topography, where feasible, maximize transportation efficiency, and ensure safe operating conditions. Roads would follow the natural terrain with side-slope cuts, cut-and-fills, and adequate drainage and erosion control structures (e.g., relief culverts, drainage culverts, wing ditches, waterbars). Permanent roads and particularly roads in areas of rough terrain or high erosion potential would be designed by, or under the direction of, a licensed professional engineer. Road construction would be monitored by qualified personnel, as deemed appropriate by the BLM. To avoid sensitive resources that may be found prior to disturbance, BLM and TMWC may select road locations that may vary slightly from those shown on Figure 2-2 (p. 2-6).

Table 2-3. Temporary and Permanent Land Disturbance under the Proposed Action.

Project Component	Amount of Disturbance per Project Component	Number of Project Components	Subtotal of Temporary Disturbance (ac)	Subtotal of Permanent Disturbance (ac)
Wind turbine generator corridor	20 mi	—	483	170
Wind turbine generators	0.016 ac	153	(52)[a]	(2.4)
Meteorological towers	0.0001 ac	14	(0.80)	(0.002)
Underground utility line within WTG corridor	16.80 mi	—	(101.8)	(40.7)
Underground utility line outside WTG corridor	2.20 mi	—	13.3	5.3
Service roads within WTG corridor	17.30 mi	—	(58.9)	(43.6)
Service roads outside WTG corridor	3.14 mi		11.4	7.5
Access roads	8.00 mi	—	61	30
Overhead electric distribution line	13.14 mi	—	160	96
Materials laydown	5.00 ac	3	15	6
Electric substation	10.00 ac	1	10	10
		Total	754	325

a. The acreages in parentheses are included in the total acreage for the WTG string ROW and are shown for informational purposes only.



0 7.5 15 22.5 30 Feet

Source:
PBS&J

Table Mountain Wind Generating Facility

Legend

TUA - Temporary Use Area
LTUA - Long Term Use Area
MET - Meteorological
WTG - Wind Turbine Generator

Figure 2-9
Wind Turbine Generator String Corridor Temporary Use ROW

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1/10/02 KH \\Vegas-gis\Projects\TableMtnWindPower\Figure2-9.mxd

Roads would be constructed with up to 4 inches of gravel base. Gravel would be hauled to the site from a permitted local off-site source. The minimum travel-way width for service roads adjacent to the WTGs would be 20 ft and the width of access roads would be 30 ft. Selected access roads would have turnouts for opposing traffic. Turnouts would be constructed within the permanent ROW along access roads that traverse steep terrain. Temporary ROW width would be 60 ft for access roads and 30 ft for service roads. Surface disturbance would be contained within the road ROW. Temporary disturbance width would increase in rugged topography due to cuts and fills necessary to construct and stabilize roads on slopes. Figure 2-10 (p. 2-24) illustrates a typical access road cross section.

Approximately 6 in of topsoil material, where available, would be removed during road construction and stockpiled in elongated rows within the road ROW. Topsoil would be respread in cut-and-fill slopes, and these areas would be revegetated as soon as possible after completion of road construction.

During WGF construction and O&M, traffic would be restricted to the roads developed for the project. Use of other unimproved roads would be restricted to emergency situations. Speed limits would be set commensurate with road type, traffic volume, vehicle type, and site-specific conditions as necessary to ensure safe and efficient traffic flow. Signs would be placed along the roads as necessary to identify speed limits, travel restrictions, and other standard traffic-control information.

2.2.2.3 Foundation Construction and Tower Erection

Foundation construction activities would occur at the WTGs, the substation, the control building, the meteorological towers, and possibly with some limited activity occurring for the distribution lines. These activities would involve concrete handling equipment such as concrete trucks, mixers, vibrators, and pumps.

Some earthmoving equipment would also be required to backfill the foundations. Pile driving and blasting may be required. If blasting is required, explosives will not be stored on public land. Any pile-driving or blasting activities would occur for short durations and would be limited to daytime only.

All WTG foundation construction activities would occur within the 200-ft WTG construction corridor. Each WTG would have a footprint of approximately 0.016 ac, including a 64-ft^2 concrete pad for the WTG transformer. The concrete foundations for the heavy-duty monopole towers would be approximately 15 to 23 ft in diameter and 20 to 30 ft deep, depending on WTG and tower type, although final design would depend on site-specific soil conditions. The foundation pads would be constructed using standard cut-and-fill procedures. For the foundation pads on steep ridges, blasting may be required for excavation. Foundations would be placed in the configuration of an annulus with the central core filled with native soil. Foundations would be drilled using a truck-mounted drill and then filled with concrete. Each foundation would require approximately 80 yd^3 of 4,000-pounds-per-square-inch (psi) test concrete, and 80 yd^3 of 1,000-psi test concrete. This quantity of concrete is equivalent to 18 truckloads of ready-mix per WTG. It would take 6,000 gal of water to make the concrete for each foundation. The concrete would be made at one of three batch plants set up at the laydown sites and trucked to the WTG sites. Anchor bolts would be embedded in the concrete, and the foundation would be allowed to cure prior to tower erection.

WTG assembly and erection would involve mobile cranes, equipment delivery, impact wrenches, and air compressors and would occur within WTG ROW corridors. No additional staging areas would be needed. Each tower would be mounted and anchor-bolted on the concrete foundations. The WTG string corridor would consist of tower pads, trenches, and access roads. After construction, temporary-use portions of the WTG assembly areas, road ROW, and all trenched areas would be reclaimed. WTG corridor width would be reduced to a 60-ft ROW. WTGs would not be fenced after placement.

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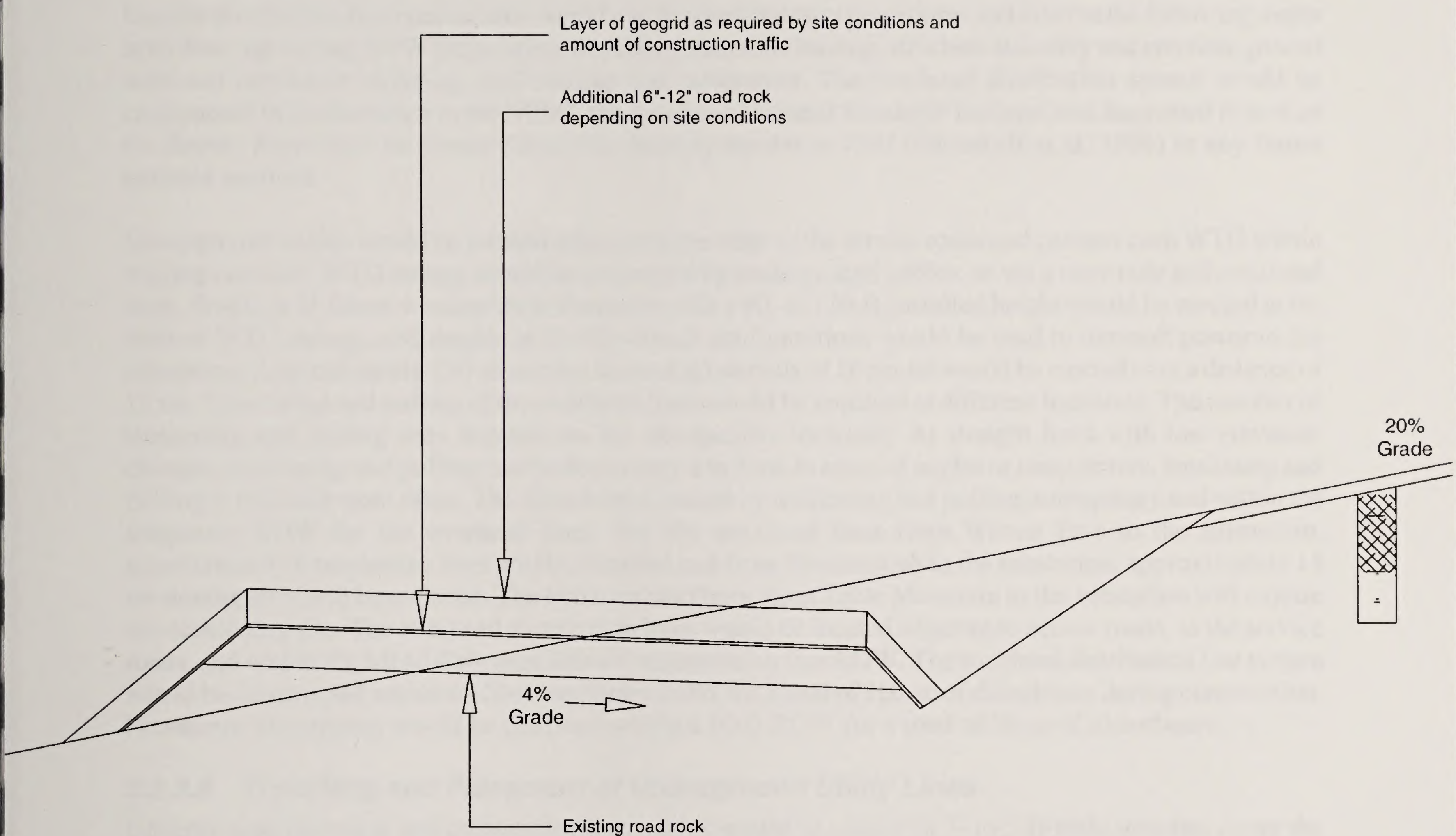

Typical section for upgrading existing site roads

Source: Oceans Engineering Limited

Table Mountain Wind Generating Facility

Figure 2-10
Typical Access Road Cross Section

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Fax: 702/263-7200

1/10/02 KH \\Vegas-gis\Projects\TableMtnWindPower\Figure2-10.mxd

Approximately 14 meteorological towers would be erected just prior to and during WGF construction. Meteorological towers range from 180 to 230 ft in height and would be erected primarily within WTG string corridors on 3-ft-diameter pier foundations. Permanent land disturbance would be 0.002 ac. Foundation depth would vary depending on local soil/rock conditions. Foundations would also be drilled using a truck-mounted drilling rig and then filled with concrete.

2.2.2.4 Distribution Line and Communications Systems Construction

Electric distribution line construction would use standard industry procedures and involve the following major activities: surveying, ROW preparation, trenching, materials hauling, structure assembly and erection, ground wire and conductor stringing, and cleanup and restoration. The overhead distribution system would be constructed in conformance to the NESC, the American National Standards Institute, and *Suggested Practices for Raptor Protection on Power Lines–The State of the Art in 1981* (Olendorff et al. 1996) or any future updated versions.

Underground cables would be located adjacent to the edge of the service roads and connect each WTG within a string corridor. WTG strings would be connected by underground cables, or via a riser pole and overhead lines. Single or H-frame wooden-pole structures with a 60- to 100-ft-installed height would be erected at the ends of WTG strings, and single- or double-circuit configurations would be used to transmit power to the substation. Approximately 130 structures located at intervals of 10 per mi would be erected over a distance of 13 mi. Tensioning and pulling of the overhead lines would be required at different locations. The number of tensioning and pulling sites depends on the site-specific locations. At straight lines with low elevation changes, tensioning and pulling can be done every 2 to 3 mi. In cases of angles or steep terrain, tensioning and pulling is required more often. The disturbance caused by tensioning and pulling is temporary and within the temporary ROW for the overhead lines. For the overhead lines from Wilson Pass to the substation, approximately 6 tensioning sites will be required and from Shenandoah to the substation, approximately 15 tensioning sites will be required. The two overhead lines from Table Mountain to the substation will require one tensioning site. The overhead distribution lines would be located adjacent to access roads, in the service roads, and within the Mead-Pahrump 230-kV transmission line ROW. The overhead distribution line system would be constructed within a 100-ft temporary ROW for a total of 160 ac of disturbance during construction. Permanent disturbance would be confined within a 60-ft ROW for a total of 96 ac of disturbance.

2.2.2.5 Trenching and Placement of Underground Utility Lines

Underground electrical and communications cables would be placed in 3- to 5-ft-wide trenches along the length of each WTG string corridor. In some cases, trenches would run from the end of one WTG string to the end of an adjacent string to link more WTGs together via the underground network. Trenches would be excavated 3 to 4 ft deep, and electric distribution lines and communications cables would be placed in the trench. Electrical cables would be installed with the trench partially backfilled before placement of the communications cables. Open trenches would be covered at night to prevent erosion and wildlife from falling in the trench. Trenches would be checked the following morning prior to installation of utility lines. Upon completion of electrical lines and communication cables, trenches would be backfilled and the area revegetated concurrently with the revegetation of other construction areas.

Approximately 19 mi of underground power cable would be installed for the project, displacing approximately 83,139 yd^3 of soil. The resulting temporary surface disturbance would be no more than 115 ac within a 50-ft temporary ROW. Forty-six acres of disturbance would be confined to a 20-ft permanent ROW. All but 4 mi of lines would be within the WTG corridor ROW; thus, additional disturbance contributable to utility line placement outside the WTG corridor would be 13.3 ac plus 5.3 ac for temporary and permanent disturbance.

Communications cables would be combined and routed to a communications building located at the proposed substation. Overhead communication lines would be installed on the structures used for overhead distribution lines so there would be no additional disturbance along the overhead distribution system. Voice and data communications and control functions would connect via underground fiber-optic cable to each WTG along and within access roads and/or distribution line ROWs to the substation. Alternatively, the fiber-optic cabling would terminate at a proposed microwave relay site (see Appendix A, VEA ROW Amendment No. N-57100) located on east Table Mountain for the transmission of control and communications functions to the substation. Underground communications cables would be buried in the same trenches used for power collection lines, so there would be no additional disturbance along WTG strings due to the communications system. Metering, relaying, and communications/operations functions for electric transmission network integration would consist of microwave links at the substation to east Table Mountain, from east Table Mountain to west Table Mountain, and from west Table Mountain to the VEA-proposed Sandy Valley warehouse.

2.2.2.6 Substation Construction

Development of the substation would be conducted using conventional methods and by specialized crews. The substation would be located near the southwest corner of the intersection of Sandy Valley Road and the BLM utility corridor containing the VEA Mead-Pahrump 230-kV transmission line. The O&M building and control room would be located within the 10-ac substation site. These facilities would be shared with VEA personnel. The construction phase would last approximately 4 to 6 months. The 10-ac fenced site would be cleared and graded. Concrete foundations would be required for all equipment and structures. Structures would be galvanized steel. Bus work would be aluminum pipe and aluminum cable. All insulators and bushings would be light-gray porcelain. Polyvinyl chloride (PVC) conduits would be buried to facilitate the routing of control cable to equipment. Station lighting would be installed in accordance with NESC requirements. These directional lights would not be on automatic control and would be lit only when personnel are inside the substation.

A grounding system that meets or exceeds the Rural Utility Standards (RUS) would be designed per available fault current at the substation. The system would be comprised of a grid of bare copper wire direct-buried in the ground approximately 18 in below the surface. Copper leads would be attached to all structures and equipment.

The 10-ft-high chainlink perimeter fence would be grounded at intervals of not more than 40 ft and at all gates. In addition, the grounding grid would extend to 3 ft outside the fence to protect anyone who may come in contact with the fence. After construction, the entire substation site would be covered with crushed rock surfacing.

Transmission line work would be consistent with modern construction practices. Two new, full-tension dead ends would be installed and would terminate the new Mead–Table Mountain and Table Mountain–Pahrump transmission line segments. Conductor lines would then be strung to the takeoff structures inside the substation. These structures would require concrete caisson foundations.

2.2.2.7 Final Testing, Final Road Grading, Erosion Control, Site Cleanup, and Restoration

Final testing would involve both mechanical, electrical, and communications inspections to ensure that all systems are working properly. Performance testing would be conducted by qualified wind-power technicians and would include checks of each WTG and the control system prior to final WTG-tower and meteorological-tower commissioning. Electrical tests of the WTGs transformers, distribution lines, and substation would be performed by qualified electricians to ensure that all electrical equipment is operational within industry and manufacturer's tolerances and are installed in accordance with design specifications. All installations and inspections would be in compliance with the applicable codes and standards listed below:

- National Codes and Ordinances
  - National Electrical Safety Code (NESC)
  - National Electrical Manufacturer's Association (NEMA)
  - American Society for Testing and Materials (ASTM)
  - Institute of Electrical and Electronic Engineers (IEEE)
  - National Electrical Testing Association (NETA)
  - American National Standards Institute (ANSI)
- State and Local Codes and Ordinances
  - Insulated Power Cables Engineers Association (IPCEA)
  - Occupational Safety and Health Act (OSHA)—Part 1910; Subpart S, 1910.308

Erosion control procedures would comply with county/state standards and would include culverts, sediment-control basins, and traps in drainages or other erosion control devices (e.g., jute netting, soil stabilizers, silt fence, check dams) to minimize soil erosion during and after construction. Surface flows would be directed away from cut-and-fill slopes and into ditches that outlet to natural drainages.

Final cleanup and restoration would occur immediately following construction. A final site cleanup would be made prior to shifting responsibilities to O&M crews. O&M crews would continue to use dumpsters for daily maintenance. Waste materials (e.g., brush, rock, construction materials) would be removed from the area and recycled or disposed of at approved facilities. Excess soil would be tamped around poles or spread on the ROW. Revegetation of cleared areas would occur immediately following completion of construction. Barriers may be placed along access roads to prevent unauthorized traffic on the ROW, if required by BLM.

2.2.3 Public Access and Safety

Public access to public lands would not be restricted, except in the immediate vicinity of the WTGs and ancillary facilities. The proposed substation would be fenced to prevent public and wildlife access to high-voltage equipment.

Lighting of the WTGs or other facilities has not been determined. The Federal Aviation Administration (FAA) generally requires lighting and/or markings on structures greater than 200 ft tall (49 CFR Part 77). The Proposed Action is located approximately 6.5 mi northwest of the proposed Ivanpah Airport near Jean, approximately 6.0 mi west of the existing Jean Airport, and approximately 5.5 mi east of the existing Sandy Valley Airport. Prior to construction and once the exact locations of the proposed WTGs are determined, GREP and/or other appropriate project sponsors would be required to submit Notices of Proposed Construction or Alteration for every WTG equaling or exceeding 200 ft, pursuant to Federal Aviation Regulations 14 CFR Part 77. Such notices will consist of descriptions of the pertinent structures and any proposed lighting or markings. The FAA will review the notices to determine the hazard to aircraft, if any, and recommend or require appropriate lighting and markings as necessary.

Although coordination with the FAA has not been initiated, based on the lighting and marking requirements of similar projects and the FAA Obstruction Marking and Lighting Advisory Circular (AC70/7460-1K), a

likely adequate marking/lighting setup for the Proposed Action can be determined. For daytime visibility, marking of the WTG towers, nacelles, and blades in alternating bands of orange and white is the default requirement. Due to the visual sensitivity of the area of the Proposed Action (see Section 3.9), an alternative to such coloration would be pursued. Two medium-intensity, flashing white lights can typically be substituted for such markings, subject to FAA review concurrence. For nighttime visibility, the medium-intensity, flashing white lights are typically adequate; however, the use of two flashing red beacons mounted on the nacelle are also typically sufficient and are more conspicuous than the white lights. Therefore, it is anticipated that the probable marking/lighting setup would consist of no structural markings, with two medium-intensity, flashing white lights operating during the day and twilight and two flashing red beacons operating during the night. The intensity of the lights would be based on a level of ambient light, with illumination below 2 ft-candles being the norm for the night and illumination of above 5 ft-candles being the norm for the day. Flashing would be simultaneous for the two sets of lights. The medium-intensity white lights would flash at approximately 40 flashes per minute, while the red beacons could flash between 20 and 40 flashes per minute. It is anticipated that the lights would not be mounted on every WTG. Most likely they would be located on several strategically selected WTGs to adequately mark the extent of the facility.

The project site is located entirely within Fire Suppression Zone 1 (BLM 1998). Because TMWC personnel are on-site during daylight working hours and in frequent communication with central operations, any fires seen would be noted immediately and reported to local authorities. Some firefighting equipment would be located at the substation site and in vehicles. Fire deterrents within the WGF would include service and access roads, which may serve as firebreaks, and regular clearing of vegetation from areas around transformers, riser poles, and buildings.

Safety signing would be posted around all towers where necessary, transformers, other high-voltage facilities, and along roads, in conformance with applicable state and federal regulations.

TMWC has demonstrated to BLM that it is committed to the safety of all employees, contractors, and visitors to the WGF and will develop a safety policy and a detailed set of guidelines for safety within the WGF. The policy identifies the chain of command for enforcing guidelines, the actions to be taken to correct unsafe or potentially unsafe conditions, and the penalties for safety violations. The policy and guidelines will be included with the Plan of Development (POD).

2.2.4 Hazardous Materials

As mandated under BLM Instructions Memoranda Nos. WO-93-344 and WY-94-059, all NEPA documents must list and describe any hazardous or extremely hazardous material that would be produced, used, stored, transported, or disposed of as a result of a proposed project. Hazardous materials are those chemicals listed in the Environmental Protection Agency (EPA) Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act of 1986; extremely hazardous materials are those defined in 40 CFR 355. Hazardous materials anticipated being used or produced during the implementation of this Proposed Action fall into the following categories:

- *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
- *Lubricants*—grease (potentially containing complex hydrocarbons and lithium compounds) and motor oil
- *Transmission line emissions*—ozone and nitrogen oxide

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- [illegible]
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- [illegible]
- [illegible]

- *Blasting equipment.*

Construction activities could create the potential for a hazardous materials spill or require disposal of hazardous materials. WTG components such as the gearbox, yaw system, nacelle, and cooling systems have the potential for spillage. Accidentally dropping equipment or equipment impacts from assembly could result in ruptures resulting in hazardous components (i.e., oil, lubricant, cooling fluids) being released to the environment. Spills that could occur during construction may also include fuel or oil spills during maintenance of or leakage from equipment at the project site. Construction equipment and O&M trucks would be properly maintained at all times to minimize leaks of motor oils, hydraulic fluids, and fuels. All vehicular maintenance would be performed off-site at an appropriate facility. Gasoline- and diesel-powered vehicles and equipment would be refueled by a mobile fuel-service truck delivering to the site.

During WGF O&M, hazardous and potentially hazardous chemicals would be used to lubricate and cool the WTGs and ancillary facilities. Each WTG contains equipment components that require lubricants, oils, or coolants. These potentially hazardous liquids would periodically need to be checked, refilled, or tested. These components include:

- Gearboxes that would each contain approximately 34 gal of oil that would not be routinely renewed

- Yaw system bearings and control gears, which would be greased, and the hydraulic oil checked and renewed every 5 years with 5 gal of oil

- A cooling system, which would contain water and ethylene glycol that would be tested annually

- Generators that would use diesel fuel.

All lubricant, oil, and coolant testing or replacement would be performed uptower; therefore, all fluids (including those resulting from accidental spills) would be contained within the confines of the nacelle and the tower structures. Additionally, the WTG models that would be installed under the Proposed Action are equipped with leakproof gaskets. These chemicals would need to be transported to the project site and some quantities would be stored on-site. To minimize the potential for harmful effects to people or the environment, lubricants and coolant stored at the project site would be held in on-site drums equipped with secondary containment areas to prevent runoff from the storage area. Spill containment facilities would be used for all chemical storage and use areas to limit the spread of potentially spilled chemicals. No extremely hazardous materials as defined in 40 CFR 355 are anticipated to be produced, used, stored, transported, or disposed of as a result of the proposed project.

Before transfer, storage, and use of federally regulated hazardous materials, a Hazardous Materials Management Plan for the project would be developed and submitted to the BLM, EPA, and Clark County for review and approval as appropriate. This plan will be presented in the POD.

2.2.5 Operations and Maintenance

All WTGs, collection and communications lines, substations, and distribution lines would be safely operated in accordance with standard industry operating procedures. The WTGs are designed to operate for a minimum of 20 years. During this period, routine maintenance would be necessary to maximize performance and detect potential difficulties. Computers would remotely scan each WTG daily to ensure operations are proceeding efficiently. Any problems would be promptly reported to on-site O&M personnel (Windsmiths). Windsmiths would perform both routine maintenance and most major repairs. Most servicing would be performed uptower (i.e., without using a crane to remove the turbine from the tower). Additionally, all roads, pads, and trenched areas would be regularly inspected and maintained to minimize erosion.

- [illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

3.3.8 Operations and Maintenance

[illegible]

Annual work force requirement for scheduled maintenance during the first year would be 70 person-hours per WTG and during the second through the tenth years, 32 person-hours per WTG. It is estimated that 10 to 20 persons would be employed for O&M of the 153 WTGs and ancillary facilities.

2.2.6 Facility Cost

The total estimated construction cost of the proposed WGF would be approximately $160 million. WGF operating costs are anticipated to be approximately $750,000 per year. This figure does not include major periodic maintenance costs such as WTG overhauls, but does include general ongoing maintenance, parts, lubricants, and ROW costs. Funding would be provided by private financing secured by TMWC.

2.2.7 Decommissioning

While the ROW grant would have a term of 20 years, it could be renewed, and thus, the anticipated life of the WGF is greater than 20 years. Assuming that there is future demand for the electricity generated by the WGF, old or worn components would be replaced or upgraded. At the end of its useful life, it would be decommissioned or renovated. If decommissioned, all structures, equipment, and footings at the site would be dismantled and removed and the land surface would be restored to the original grade. Reclamation would be conducted on all disturbed areas to comply with the BLM policy on reclamation. The short-term goal of reclamation would be to stabilize disturbed areas as rapidly as possible, thereby protecting sites and adjacent undisturbed areas from degradation. The long-term goal would be to return the land to approximate predisturbance conditions. Distribution lines and structures would also be dismantled and removed. The ROW grant issued to TMWC would include a reclamation plan and bond. The ROW grant would also require the submission of a decommissioning plan to be due at least 6 months prior to expiration of the ROW grant.

At a minimum, the decommissioning plan would:

- Identify and discuss the proposed decommissioning activities and how they would comply with the applicable regulatory requirements
- Describe the alternative decommissioning activities
- Justify the selection of the proposed decommissioning activities.

In accordance with FLPMA, as amended, the BLM would require TMWC to furnish a bond, or other security, to ensure that TMWC would comply with the terms and conditions of the BLM ROW grant.

2.2.8 Project Design Refinement

Surface disturbance locations and acreages identified in the previous sections are anticipated to be sufficient for the construction and operation (including maintenance) of the WGF and all ancillary improvements. However, due to project refinement, locations and acreages of anticipated disturbance have the potential to change. This section describes the procedures for assessing workspace outside the areas evaluated in this DEIS. Analyses in this DEIS cover more space than would be required for the proposed facilities. For example, although the project would be expected to permanently disturb up to 325 ac, approximately 700 ac were surveyed for biological resources and 700 ac for cultural resources. The centerline of the corridors was based on a preliminary level of engineering; however, as the design is refined, the alignments may change to increase safety, minimize environmental disturbance, and provide adequate grade on steep slopes and across deep washes. These refinements could result in location changes for turnout areas and passing lanes, additional workspace, staging areas, and the alignment of the access roads.

Where work is required outside the areas evaluated in this DEIS, additional evaluation would be performed for biological and cultural resources to ensure they were not adversely affected. Location of the workspace, date, and survey results would be documented and forwarded to the BLM. In cases where no new state- or federally protected species or cultural resources are found, work would proceed. In cases where new species or cultural resources are found, the agency would provide direction. As-built drawings would be provided to the BLM at the end of the project.

2.3 Alternative A

Under Alternative A, the BLM would issue a ROW grant for the construction, operation, and maintenance of a nominal 150-MW WGF within the Table Mountain WGF project area, located in Clark County in southern Nevada. The fully constructed WGF would consist of an array of 187 NEG Micon 900 (or comparable manufacturer and type) WTGs and the ancillary facilities and equipment described for the Proposed Action (Figure 2-4, p. 2-11). The locations of the WTGs would basically follow the elevation contours near a sudden change in slope and be arranged in rows or strings along and near the top of the ridges within the project area. Specifically, 126 WTGs would be located along Table Mountain, 37 WTGs along Shenandoah Peak and its ridgeline, and 24 WTGs along Wilson Pass. All WTG string alignments, facilities, construction, and O&M would be the same as described for the Proposed Action except there would be 34 more WTGs. This would result in a 0.5 ac increase in permanent site disturbance over the Proposed Action. All other facilities would be identical in size and number regardless of the alternative selected.

2.4 Alternative B

Under Alternative B, the BLM would issue a ROW grant to for the construction, operation, and maintenance of a nominal 205-MW WGF within the Table Mountain WGF project area, located in Clark County in southern Nevada. The fully constructed WGF would consist of an array of 135 NEG Micon 1500 (or comparable manufacturer and type) WTGs and the ancillary facilities and equipment described for the Proposed Action (Figure 2-5, p. 2-12). The locations of the WTGs would basically follow the elevation contours near a sudden change in slope and be arranged in rows or strings along and near the top of the ridges within the project area. Specifically, 91 WTGs would be located along Table Mountain, 27 WTGs along Shenandoah Peak and its ridgeline, and 17 WTGs along Wilson Pass. All WTG string alignments, facilities, construction, and O&M would be the same as described for the Proposed Action except there would be 18 fewer WTGs. This would result in a 0.3 ac decrease in permanent site disturbance. All other facilities would be identical in size and number regardless of the alternative selected.

Table 2-4 (p. 2-32) illustrates the locations, number of WTGs, site disturbance acreage, and the power capacity (assuming 800 kW per WTG) for the Table Mountain WGF as defined in the Proposed Action and the alternatives.

2.5 No-Action Alternative

Section 1502.14(d) of the NEPA regulations requires the alternatives analysis in the EIS to "include the alternative of no action." Under the No-Action Alternative, BLM would not issue a ROW grant to allow TMWC to construct and operate and maintain the WGF. Under the No-Action Alternative, no WTGs, underground collection cables, overhead distribution lines, new access roads, or the substation would be constructed. The proposed project site would remain in its current state. Wind resources at the Table Mountain site would remain undeveloped.

[illegible]

2.3 Alternative A

[illegible]

2.4 Alternative B

[illegible]

[illegible]

2.5 [illegible]

[illegible]

Table 2-4. Proposed Wind Turbine Generator Scenarios, Locations, Site Disturbance, and Capacity.[a]

		Location					
Scenario	WTG Model	Table Mountain	Shenandoah Peak	Wilson Pass	Total WTGs	Difference In Site Disturbance[a] (ac)	Nominal Capacity (MW)[b]
Proposed Action	NEG Micon 1500	17	28	10	55		
	NEG Micon 900	80	8	10	98		
	TOTAL	97	36	20	153	—	191
Alternative A	NEG Micon 900	126	37	24	187	3.0	150
Alternative B	NEG Micon 1500	91	27	17	135	2.2	205

a. All other facilities and alignments would be the same for all alternatives. Difference is compared with the Proposed Action.

b. Assumes use of NEG Micon 900 and 1500 WTGs (or comparable manufacturer and type).

The No-Action Alternative is not expected to result in direct development of another energy source within the 4,500-ac area encompassing the Proposed Action. Demands for base-load and peak-load electric power are increasing and are expected to increase throughout the southwest. The No-Action Alternative would provide that an incremental part of the future power deficit of the Arizona–New Mexico–Southern Nevada Power Area and the California-Mexico Power Area would not be accommodated by using wind energy.

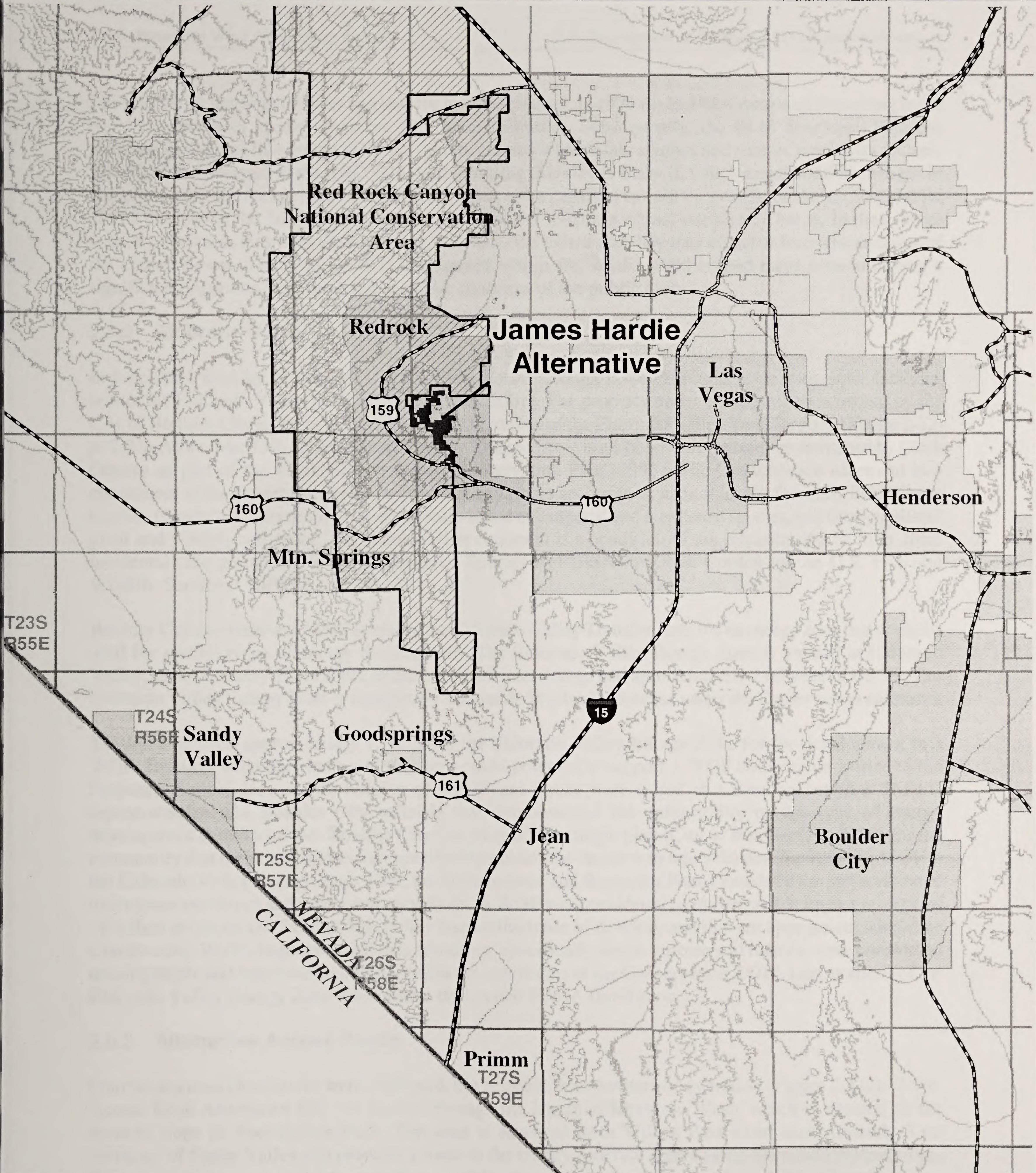
2.6 Alternatives Considered but Eliminated from Further Consideration

The sections below describe alternative locations for WGF development that were considered in development of the project, but were rejected from further consideration, and the reasons for their rejection. Two alternative locations were considered but rejected because they did not meet the purpose and need or were not reasonably feasible. These alternatives are described below, but are not discussed further in this DEIS.

2.6.1 James Hardie Gypsum Mine

The James Hardie Gypsum Mine Complex (Hardie Complex) was evaluated for development of a WGF. The Hardie Complex is located within the southern portion of the Spring Mountain Range along the ridge top of Blue Diamond Hill. It is approximately 7 mi west of the City of Las Vegas, approximately 4 mi northwest of the intersection of State Highway 160 (SH 160) and State Highway 159 (SH 159), and approximately 1.5 mi east of the intersection of SH 159 and Spring Mountain Ranch State Park (Figure 2-11, p. 2-33). The Hardie Complex is directly bounded to the north and the west by the RRCNCA, which is managed by the BLM, and further to the west by the Humboldt-Toiyabe National Forest. A portion of the Hardie Complex is located on private lands, while several parcels are located within the RRCNCA or lie along the RRCNCA boundary. The area evaluated encompassed approximately 1,100 ac.

Discussions between TMWC, the BLM, and Hardie Complex employees resulted in the rejection of this alternative due to its proximity to the Humboldt-Toiyabe National Forest and the RRCNCA and the associated unmitigatable visual impacts on these two areas from the project.



Miles
0 2.5 5 10

Source: Clark County (GISMO)

Table Mountain Wind Generating Facility

Legend

Alternative Site James Hardie Gypsum Mine Properties

Red Rock Canyon National Conservation Area

200-Meter Contours

Figure 2-11
James Hardie Gypsum Mine Alternative

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The RRCNCA has long been recognized for its scenic values. In 1976 the FLPMA was passed resulting in the equal placement of scenic resources with other resources. Subsequently, the BLM developed land use planning guidelines that assigned scenic quality classes with distance zones and viewer sensitivity factors. The BLM has designated the RRCNCA lands abutting this site as Class II, which mandates that changes in any of the basic landscape elements (i.e., form, line, color, texture) caused by a management activity should not be evident in the landscape; contrasts are seen, but must not attract attention. That is, in these areas authorized actions may alter the landscape, but not to the extent that they may attract or focus the attention of the casual viewer. The array of WTGs proposed within the WGF would exceed these criteria having a significant impact on the visual and aesthetic character of the public lands.

2.6.2 Eldorado Valley

In June 2001 the City of Boulder City, Nevada, issued a Request for Proposals to develop solar facilities within the Eldorado Valley (City of Boulder City 2001). The property under consideration is owned by the City of Boulder City and was acquired by the City as part of the Eldorado Valley Transfer Area (Figure 2-12, p. 2-35). More than 75% of the Eldorado Valley Transfer Area is a Conservation easement dedicated by Clark County as part of the Clark County Desert Conservation Plan (1995). The Conservation easement is a component of the Desert Conservation Plan that conserves and protects habitat for the federally listed desert tortoise (*Gopherus agassizii*), a variety of state-listed endangered and threatened species, and other nonlisted plant and wildlife resources. The Conservation easement is a condition of the issuance of a Section 10(a) incidental take permit under the Endangered Species Act (ESA) to Clark County by the U.S. Fish and Wildlife Service (USFWS).

Boulder City has reserved 3,000 ac within the Eldorado Valley Transfer Area for an energy zone that could be used for several types of energy development. The Eldorado Valley Energy Zone is located in Eldorado Valley, approximately 12 mi south of the US 95/93 interchange and approximately 2 mi west of US 95. The Eldorado Valley Energy Zone is completely surrounded by lands reserved under the Conservation easement.

TMWC evaluated approximately 1,760 ac in the Eldorado Valley Energy Zone for the development of a WGF. Existing wind data indicated this area could potentially support a WGF comparable in size to the Proposed Action. However, a number of significant issues were raised at a meeting between TMWC representatives and Boulder City officials that demonstrated the unfeasibility of this type of energy development at this location. Boulder City has adopted a strategic plan (City of Boulder City 2000) for the community that includes policies that specifically guided the decision to reject the development of a WGF in the Eldorado Valley Energy Zone. First, the Environment and Resources Policy mandates the preservation of open-space resources and associated viewsheds. A WGF was considered an unmitigatable impact in terms of viewshed preservation. Second, this policy frames the types of development that are appropriate within the Conservation ROW. Impacts on wildlife resources, specifically desert tortoise and raptors, were considered unmitigatable and therefore inconsistent with the conditions of the Conservation ROW. Last, portions of the Eldorado Valley Energy Zone are within a designated FEMA flood zone.

2.6.3 Alternative Access Roads

Four access road alternatives were evaluated, but rejected from further consideration (Figure 2-13, p. 2-36). Access Road Alternative No. 1 is located through the length of Keystone Wash, which is situated on the western slope of Shenandoah Peak. This area is accessed from Wilson Pass Road approximately 3 mi northeast of Sandy Valley and provides a route to the energy generation area along Shenandoah Peak ridge. This alternative was rejected from further consideration due to the presence of pre-1955 patented mining claims through which the proposed road would have to be constructed.

The [illegible] has been [illegible]

6.0.2 Eldorado Valley

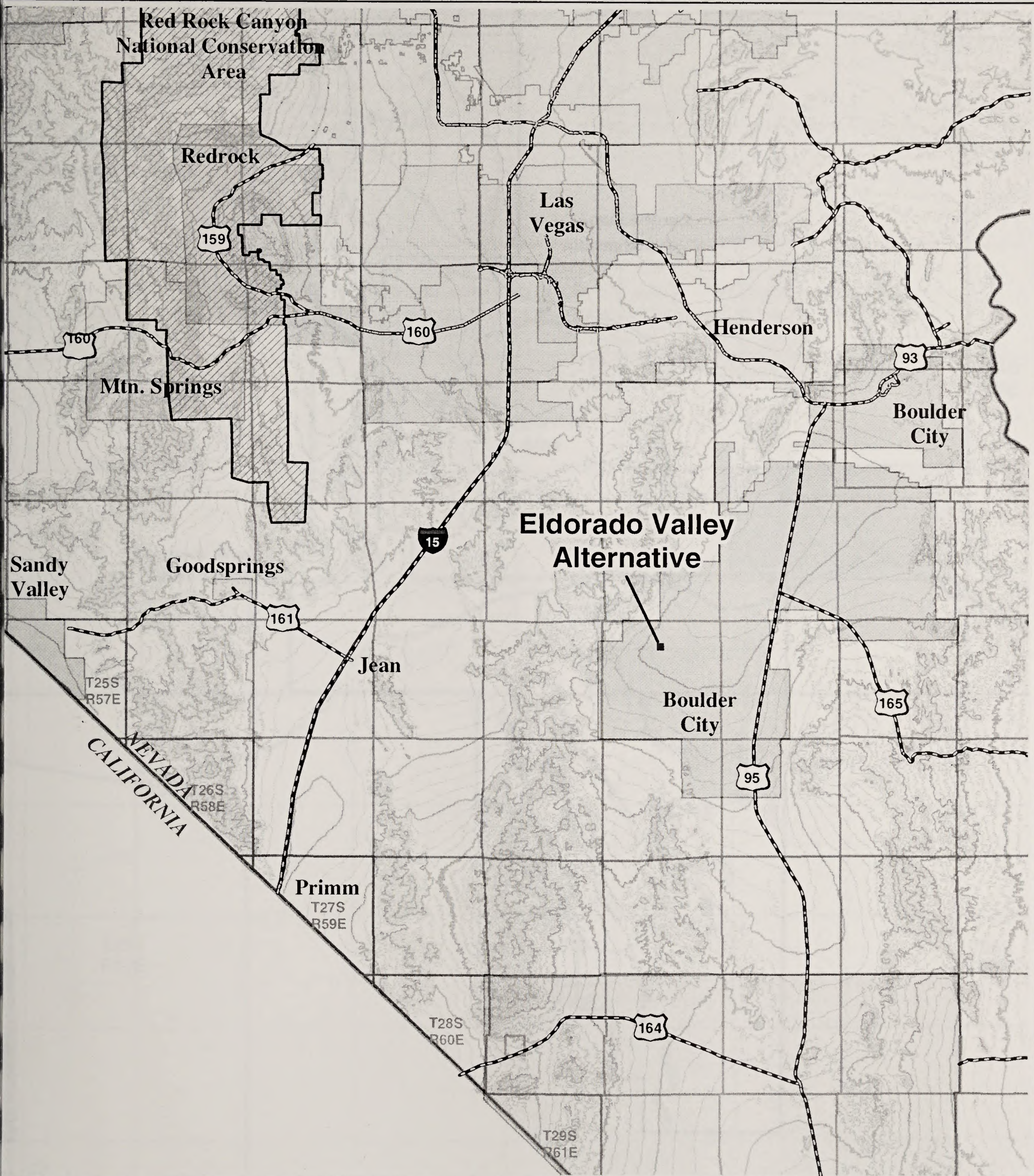
In [illegible] the Eldorado Valley [illegible] City of Boulder City [illegible]

Boulder City [illegible]

[illegible]

6.0.3 [illegible]

[illegible]



N

0 2.5 5 10 Miles

Source: Clark County (GISMO)

Table Mountain Wind Generating Facility

Legend

Red Rock Canyon National Conservation Area

50-Meter Contours

200-Meter Index Contours

Figure 2-12
Eldorado Valley Alternative

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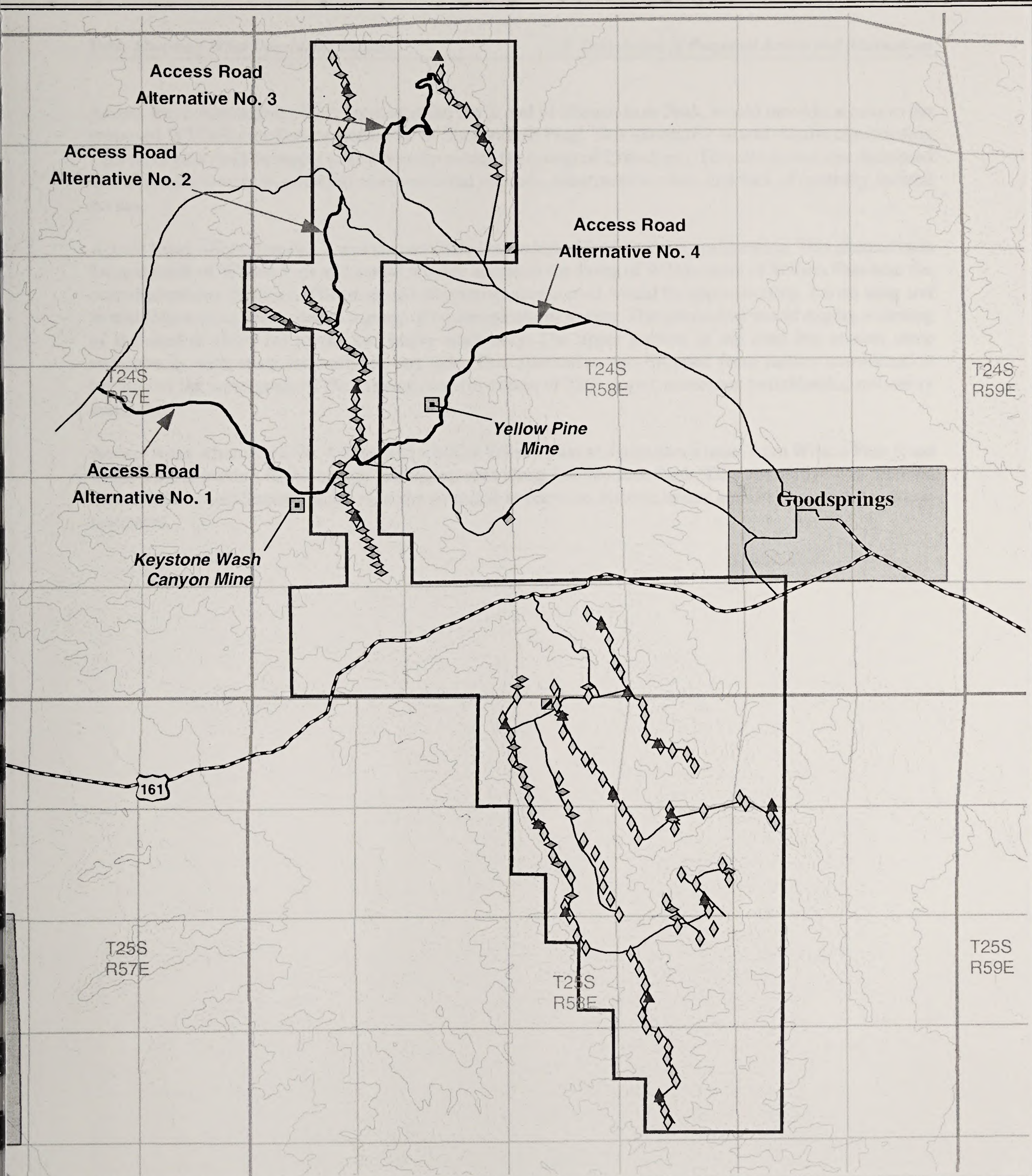

Table Mountain Wind Generating Facility

Legend

Alternative Access Roads
Access and Service Roads
Table Moutain Project Area
50-Meter Contours
200-Meter Index Contours

0 0.25 0.5 1 Miles

Figure 2-13
Alternative Access Road Locations

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Access Road Alternative No. 2, located at the north end of Shenandoah Peak, would provide access to the proposed WTGs located on the north side of Shenandoah Peak. This alternative would require constructing 1.58 mi of new road through extremely steep terrain (in excess of 25% slope). This alternative was dismissed due to the steep terrain, potential environmental impacts, construction costs, and lack of centrally located access.

Access Road Alternative No. 3 was also evaluated but rejected from further consideration. This alternative is located north of Wilson Pass and would provide access to the string of WTGs north of Wilson Pass near the communications facilities. The proposed alternative access road would be approximately 1.8 mi long and would follow an existing road to a group of communications towers. This alternative would require widening of the road to allow for trucks and heavy machinery. The upper portion of the road has several steep switchbacks with steep drop-offs on one side. This alternative was dropped from further consideration because of the steep grade of the existing road (in excess of 25% slope), numerous switchbacks, and safety concerns.

Access Road Alternative No. 4 is located south of Wilson Pass and provides a route from Wilson Pass Road to the central portion of the energy generation area along Shenandoah Peak. This alternative was rejected from further consideration because of the potential impacts on historic mines and other sensitive cultural resources.

3.0 AFFECTED ENVIRONMENT

Chapter 3 describes the existing environment that may be affected by implementing the Proposed Action, Alternative A, or Alternative B, including the physical, biological, cultural, land use, visual, and socioeconomic resources of the proposed project area. The affected environment discussion for each resource of concern focuses on the condition of the resource base at the proposed WTG sites and sites of all ancillary facilities such as underground and overhead 34.5-kV distribution lines, communications system, access and service roads, meteorological towers, and the proposed electric substation.

3.1 Geology, Seismicity, Soils, and Mining

3.1.1 Geology

The Proposed Action and Alternatives A and B lie at the southern end of the Spring Mountain Range in southern Clark County, Nevada. The Spring Mountains are located in the southern part of the Great Basin, or Basin and Range Province (BRP) (Figure 3-1, p. 3-2). This basin covers an area of more than 380,000 square miles (mi^2) in eight western states (Eaton 1982). Among the general characteristics of the BRP are high crustal heat flow, a regionally elevated topography, active faults, and seismicity (Guth et al. 1988; Eaton 1982; Zoback et al. 1981). These physical characteristics are a manifestation of extensions in the earth's crust, which may be related to tectonic boundary interactions between the North American and Pacific Plates (Zoback et al. 1981). The crustal extension in the BRP is generally oriented in an east-west direction, which has led to the present-day topographic pattern of parallel, north-trending mountain ranges and intervening fault-bounded sedimentary basins. In most areas of the BRP, extension began during early Miocene time about 17 to 20 million years ago (Zoback et al. 1981; Eaton 1982). However, in the southern Nevada region, crustal extension is thought to have started during the interval of 12 to 16 million years ago and has involved strike-slip faulting as well as the more typical BRP mode of normal and detachment faulting (Wernicke et al. 1988; Duebendorfer et al 1991). Many of the mountain ranges in southern Nevada are bounded by normal faults that are suspected to have been active into the Quaternary period (Dohrenwent et al. 1991).

The BRP contains many different rock units that span the geologic time scale from the Precambrian up to the present (Stewart 1980). Basin-fill deposits typically include alluvium, eolian, and lacustrine sediments. The lithologies exposed within the mountain ranges include sedimentary rocks such as quartzite, shale, dolomite, and limestone; metamorphic rocks such as gneiss, schist, and phyllite; igneous intrusive rocks such as granite stocks and basalt dikes; and a diverse suite of volcanogenic deposits (Stewart and Carlson 1978). The older rocks have commonly been affected by tectonic events and have undergone at least some structural deformation and metamorphism.

Bedrock exposed in the northern two-thirds of the Spring Mountains is of a sedimentary origin. The sedimentary rocks present include limestone, dolomite, quartzite, and sandstone. The southern third of the range contains intrusive and extrusive rocks in addition to the sedimentary rocks listed above (Longwell et al. 1965). Portions of the proposed Table Mountain WGF are also situated on sediments mapped by Longwell et al. (1965) as Recent and possibly Pleistocene alluvium. Table Mountain is one of two main areas of extrusive rocks lying southwest of Goodsprings. A sequence of tuffs and breccias is overlain by an andesitic flow that ranges in thickness from 200 ft to more than 600 ft. The volcanic rocks around the edges of Table Mountain all dip inward, and Hewett (1931) suggests that the vent from which these rocks issued is near the center of the area (Longwell et al. 1965).

In addition to the volcanics that compose Table Mountain, other geologic units in the project area include the Goodsprings Dolomite, Sultan Limestone, Monte Cristo Limestone, Birdsprings Formation, and Quaternary Alluvium (Figure 3-2, p. 3-3). The Goodsprings Dolomite, originally described by Hewett (1931), is exposed

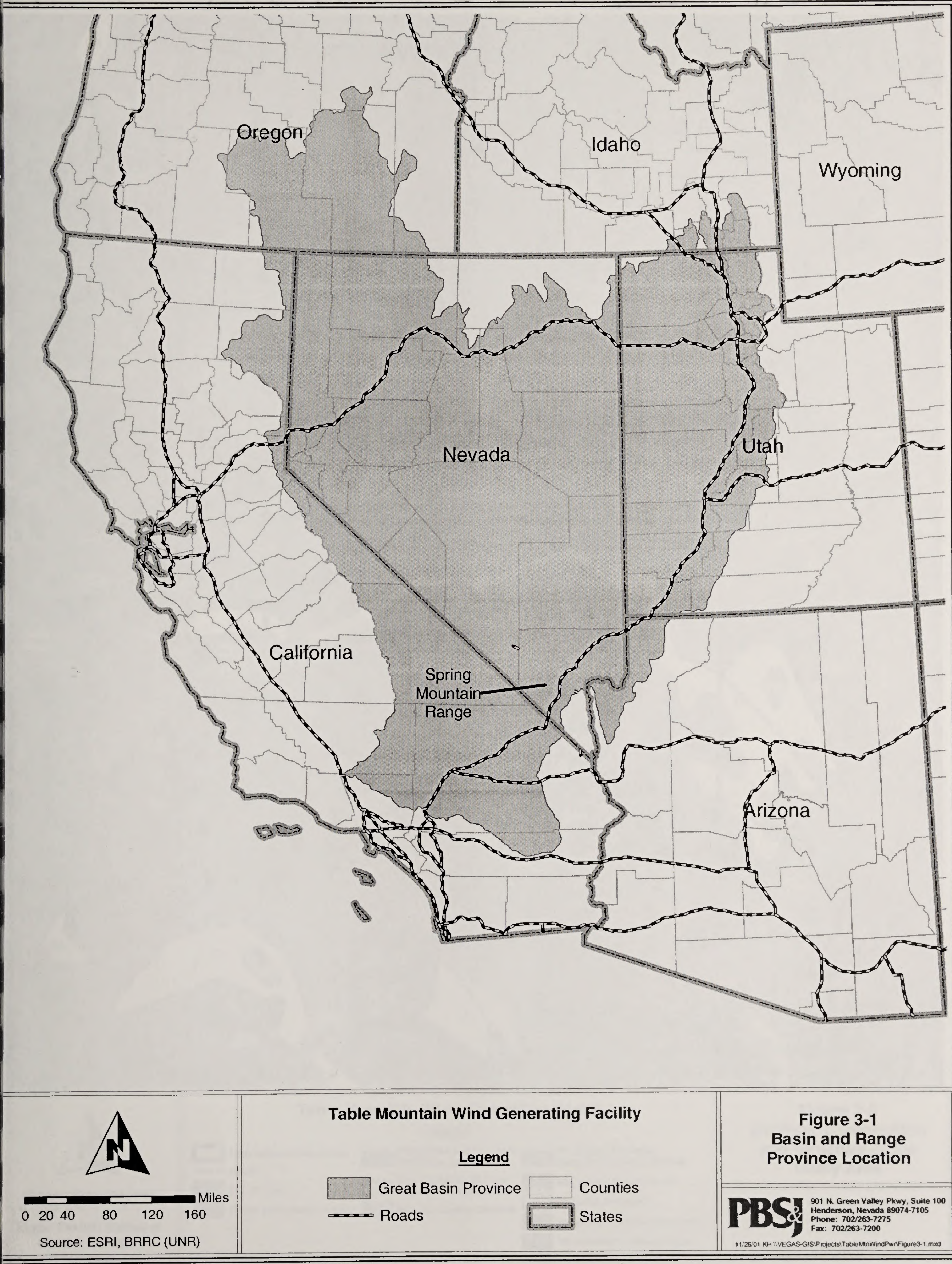
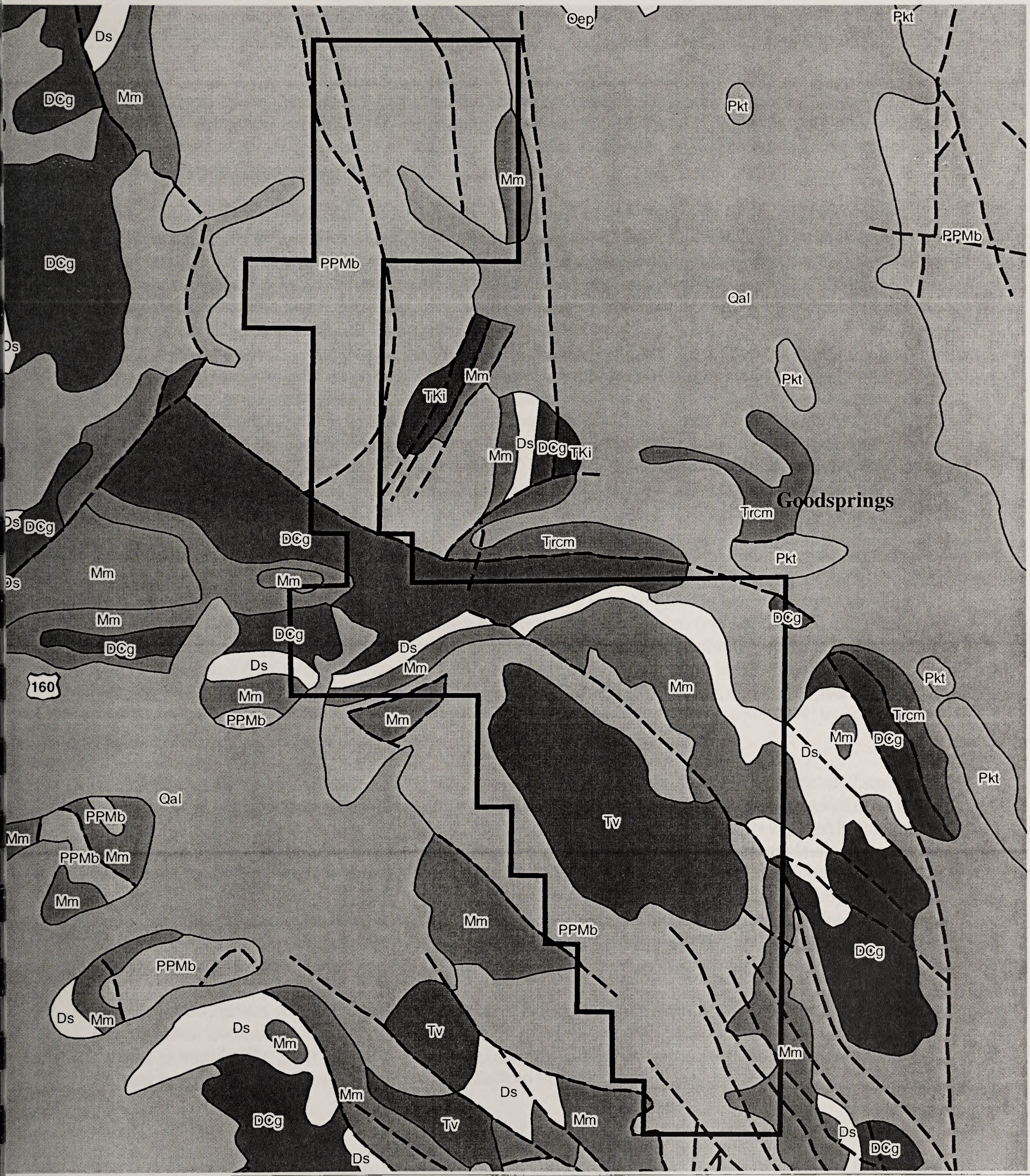


Table Mountain Wind Generating Facility

Figure 3-1
Basin and Range Province Location



Source: Nevada Bureau of Mines & Geology

Table Mountain Wind Generating Facility

Legend

- Table Moutain Project Area
- Faults
- Qal, Alluvium
- PPMb, Bird Spring Formation
- Trcm, Chinle and Moenkopi Formations, undivided
- Oep, Ely Sp Dol, Ek Quart, Pogonip Gr, undifferentiate
- DCg, Goodsprings Dolomite
- Pkt, Kaibab, Toroweap, Coconino Formation, red beds
- Mm, Monte Cristo Limestone
- Ds, Sultan Limestone
- Tv, undifferentiated volcanic rocks
- TKi, undivided porphyritic rocks

Figure 3-2 Geologic Composition and Structure of the Study Area

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in the southern Spring Mountain Range, the Bird Spring Range, and at Sheep Mountain (Longwell et al. 1965). This formation consists of a monotonous sequence of thin-bedded, light- to dark-gray mottled dolomite, with a 50- to 75-ft layer of dolomitic limestone and sandy shale present near the top of the formation locally (Longwell et al. 1965).

The Sultan Limestone Formation, with a maximum thickness of 765 ft (Hewitt 1931), has been subdivided into three members: the basal Ironside Dolomite Member (up to 125 ft thick), the middle Valentine Limestone Member (up to 380 ft thick), and the upper Crystal Pass Limestone Member (up to 260 ft thick). The Ironside Dolomite Member is dolomite in composition, the Valentine Limestone Member ranges in composition from nearly all limestone at some localities to almost exclusively dolomite at others, and the Crystal Pass Limestone Member is virtually all limestone.

The Monte Cristo Limestone was named by Hewett (1931) based upon exposures of Mississippian-age rocks in the southern Spring Mountains. The Monte Cristo Limestone is not extensively exposed in the project area. The Birdsprings Formation overlies the cliff-forming limestone and dolomites of the Monte Cristo Formation. The basal portion of the Bird Spring Formation consists of sandstone, shale, and thin limestone layers; these are overlain predominantly by limestone and dolomite. Layers of shale, and impure and numerous zones are relatively thin-bedded, due to which the formation on the whole is less resistant than the underlying Monte Cristo Formation (Longwell et al. 1965).

3.1.2 Faults and Seismicity

The current level of seismicity in southern Nevada is relatively low compared to more active parts of the BRP (Rogers et al. 1991; Harmsen 1991). There have been no major earthquakes (greater than 6.0 magnitude) in the vicinity of Las Vegas since at least 1852. The record of seismicity in southern Nevada is dominated by small earthquakes (less than 4.0 magnitude) that generally occur in two areas: in the vicinity of the Nevada Test Site (which suggests the seismographs were recording nuclear explosions), and in the Lake Mead area, which may be related to strain release in the crust after the lake was filled (Rogers et al. 1991; Rogers and Lee 1976).

The geologic structure of the Spring Mountains is exceptionally complex. Dominant features are large thrust faults, some of which extend across the range, whereas others have more limited extent (Longwell et al. 1965) (Figure 3-2, p. 3-3). The Keystone Thrust fault, located in the Goodsprings District, is exposed for more than 45 mi in the Spring Mountains. The Keystone Thrust is part of a large system of thrust faults that extends north into Canada and began to develop approximately 65 million years ago. It is offset along its outcrop by several normal faults and a strike-slip fault, the Ironside Fault (Hewitt 1931). In addition, many other thrust faults have been recognized both above and below the Keystone Thrust, including the Green Monster, Milford, Sultan, Contact, Potosi, and Wilson thrusts. Within the Goodsprings District, thrust-faulting appears to postdate much of the folding.

The Proposed Action site is located within Seismic Zone 2B as defined in the Uniform Building Code (International Conference of Building Officials [ICBO] 1994). Zone 2B is defined as an area with moderate damage potential. The potential for damage from seismic activity becomes more severe in Zones 3 and 4. Current design practices require facilities to be built to Seismic Zone 4 standards.

3.1.3 Soils

The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) (2001) has mapped the soils in the project area (Figure 3-3, p. 3-5). The majority of the soils in the northern portion of the project area are classified in the Potosi-Zeheme-Rock Outcrop Association, which consists of extremely gravelly

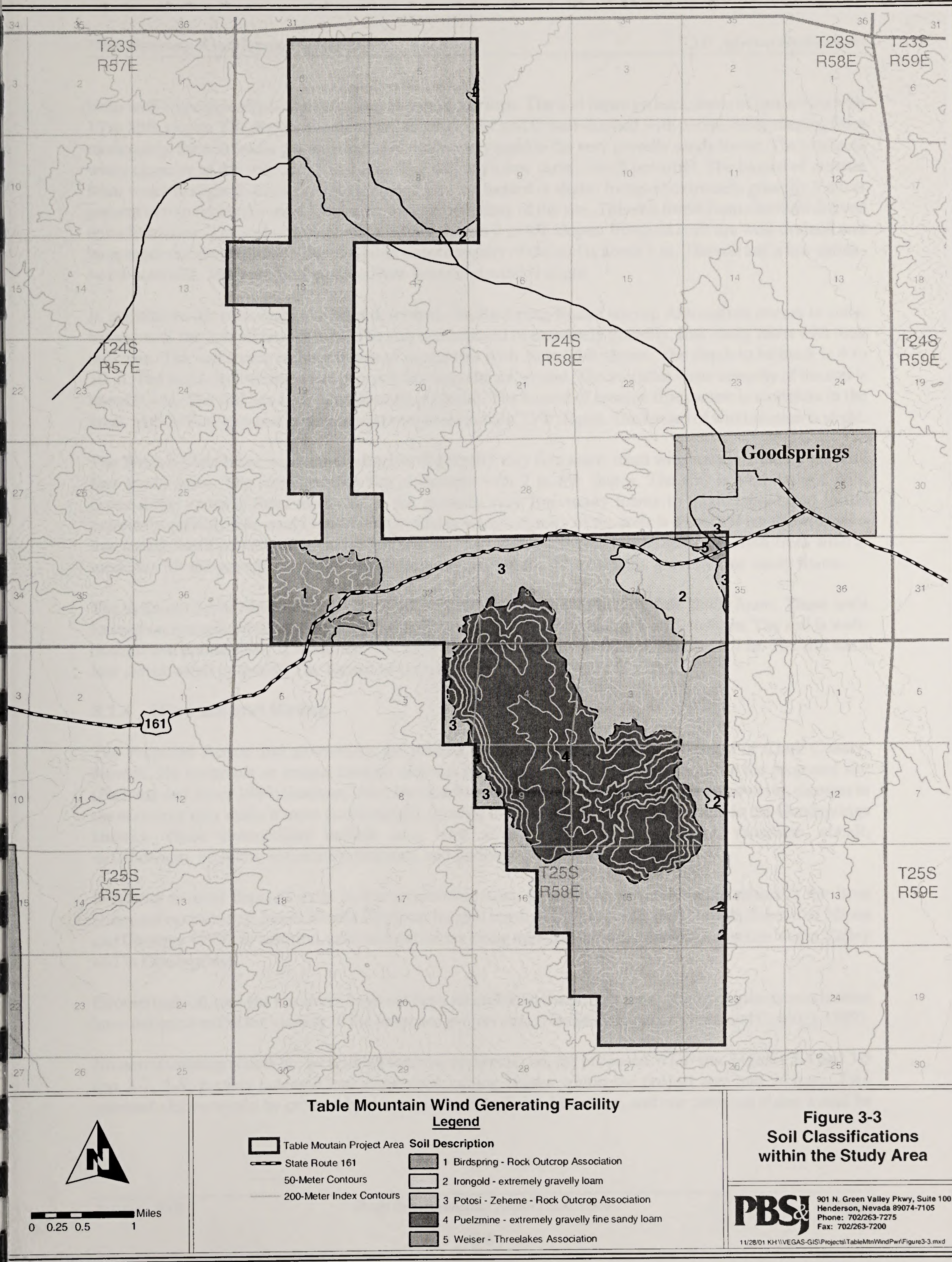

Figure 3-3
Soil Classifications within the Study Area

loam with some gravelly fine sandy loam and rock outcrops. The soil forms on backslopes of mountains with 15 to 50% slopes. The depth to bedrock is 7 to 14 in. The soil is well-drained with permeability ranging from moderate in the extremely gravelly loams to moderately rapid in the very gravelly sandy loams. The available water capacity of the soils is 1.1 to 1.2 in. The soil has a low shrink-swell potential. The hazard of erosion from water is slight to moderate and the wind erosion hazard is slight. Irongold extremely gravelly loam is present in two relatively small areas near the east boundary of the site. This soil forms from alluvium derived from limestone. The soil occurs on fan piedmonts with 2 to 8% slopes. Irongold soils are well-drained and have moderate permeability. The available water capacity of the soil is about 3 in. The soil has a low shrink-swell potential. The hazard of erosion from water and wind is slight.

In addition to the soils that have been described, the Birdsping-Rock Outcrop Association occurs in some locations of the central project area. The soil is composed of extremely gravelly, fine sandy loam with rock outcrops. The soil forms on backslopes of mountains with 30 to 75% slopes. The depth to bedrock is 4 to 10 in. The soil is well-drained and permeability is moderately rapid. The available water capacity of the soil is about 0.4 in. The soil has a low shrink-swell potential. The hazard of erosion from water is moderate in the areas with 30% slopes and increases to severe in areas with 75% slopes. The hazard of wind erosion is slight.

The Weiser-Threelakes Association consists of gravelly very fine sandy loam with some extremely gravelly fine sandy loam. The soil forms on fan piedmonts with 2 to 8% slopes. The soil is well-drained with permeability ranging from moderate in the gravelly very fine sandy loams to moderately rapid in the extremely gravelly fine sandy loams. The available water capacity of the soils is 3.0 to 4.0 in. The soil has a low shrink-swell potential. The hazard of erosion from water is slight. The hazard of erosion from wind is moderate for the gravelly very fine sandy loams and slight for the extremely gravelly fine sandy loams.

The soils on Table Mountain are classified a Puelzime extremely gravelly fine sandy loam. These soils formed on summits of lava flows with 4 to 15% slopes. The depth to bedrock is 30 to 40 in. The soil is well-drained and permeability is moderate. The available water capacity of the soil is about 0.7 in. The soil has a low shrink-swell potential. The hazard of erosion from wind and water is slight.

3.1.4 Minerals and Mining

The Proposed Action and alternatives are located in the Goodsprings Mining District of Clark County, Nevada. No economic or unique mineral deposits have been identified at or adjacent to the proposed site (Fleming and Jones 1989; Bonham 1989; Nevada Bureau of Mines and Geology 1999); however, changes in the economy may make it more economically feasible to mine the commodities located in the Goodsprings District. These commodities include zinc, lead, silver, gold, copper, platinum, vanadium, cobalt, molybdenum, uranium, antimoney, titanium, and perlite.

Industrial mineral deposits exist in the surrounding area. Gypsum is currently being mined at the Blue Diamond operation of James Hardie Gypsum, located north of the proposed site (Nevada Bureau of Mines and Geology 1999). In addition, sand and gravel are being mined at various locations in the Las Vegas Valley and in Goodsprings.

Geothermal, oil, and gas resources have not been identified in the project area. Metals exploration activities have not occurred in the vicinity of the proposed project area (Nevada Bureau of Mines and Geology 1999).

Numerous mining claims are located adjacent to, or directly on, the proposed WGF site. Figures 3-4 and 3-5 (pp. 3-7, 3-8) present patented and unpatented mining claims within the project area and vicinity. Two patented claims would be crossed by the access road to Table Mountain, and one patented claim would be

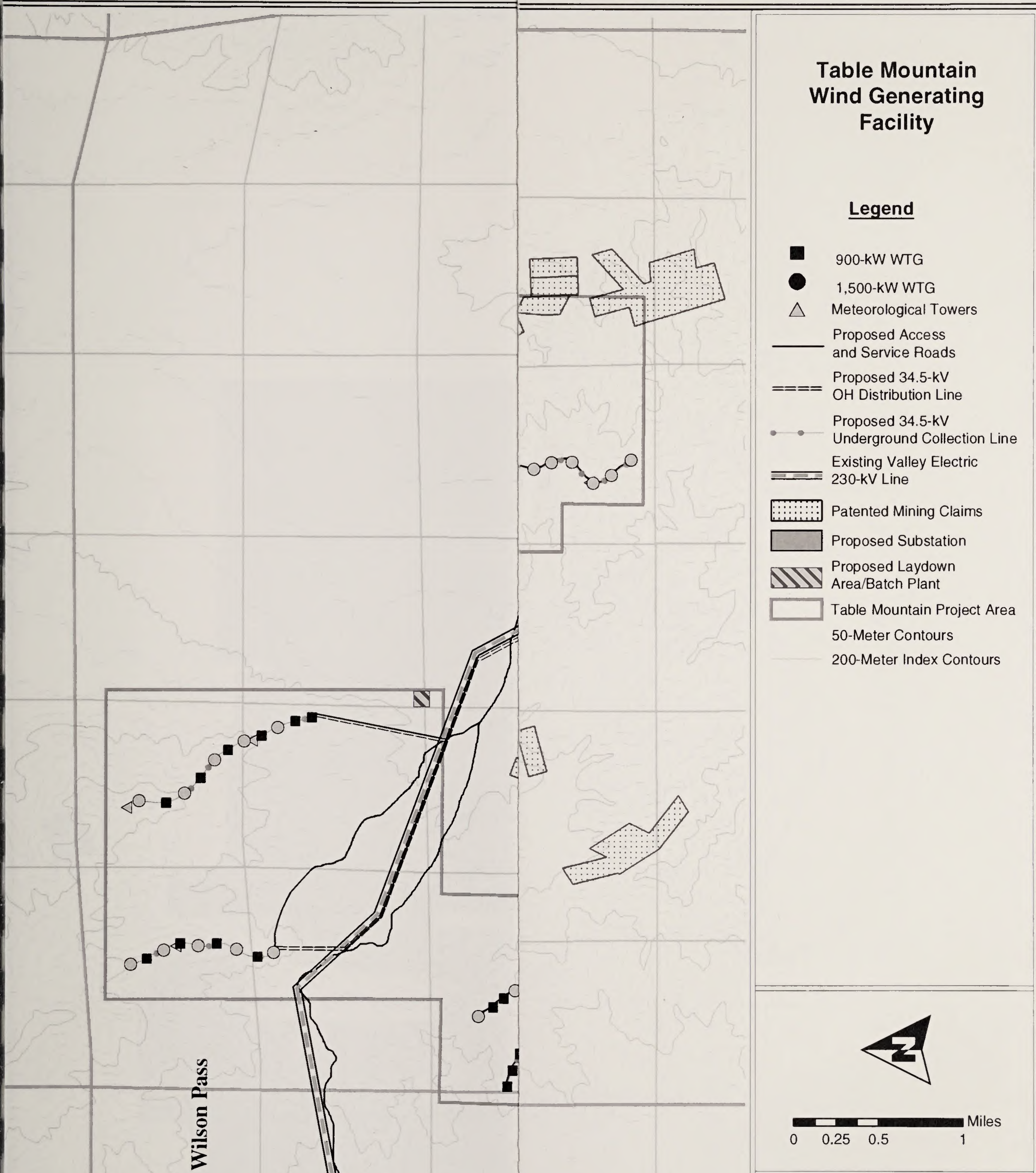

Figure 3-4
Patented Mining Claims within the Project Area and Vicinity

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Figure 3-4
Patented Mining Claims within the Project Area and Vicinity

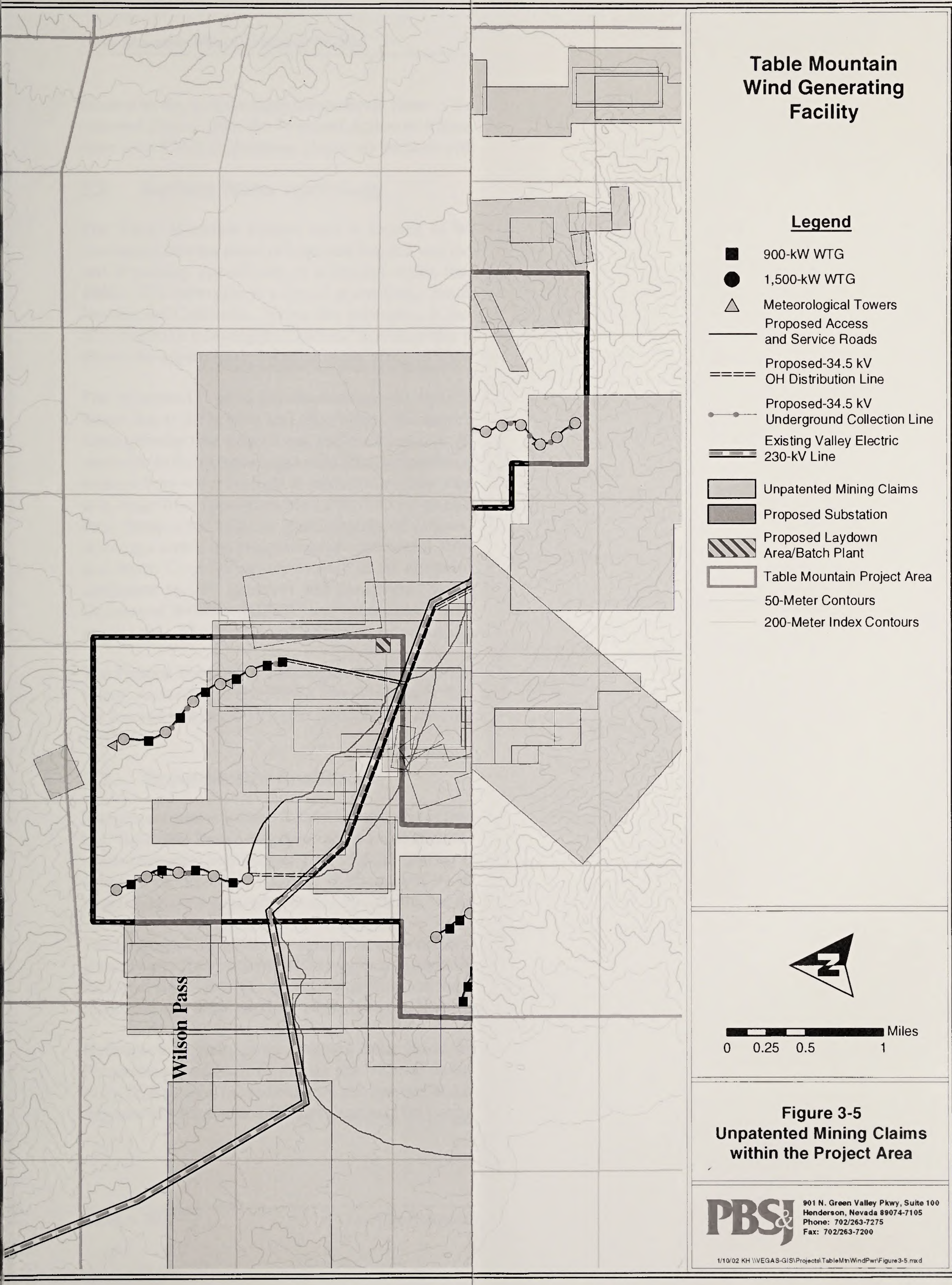

Figure 3-5
Unpatented Mining Claims within the Project Area

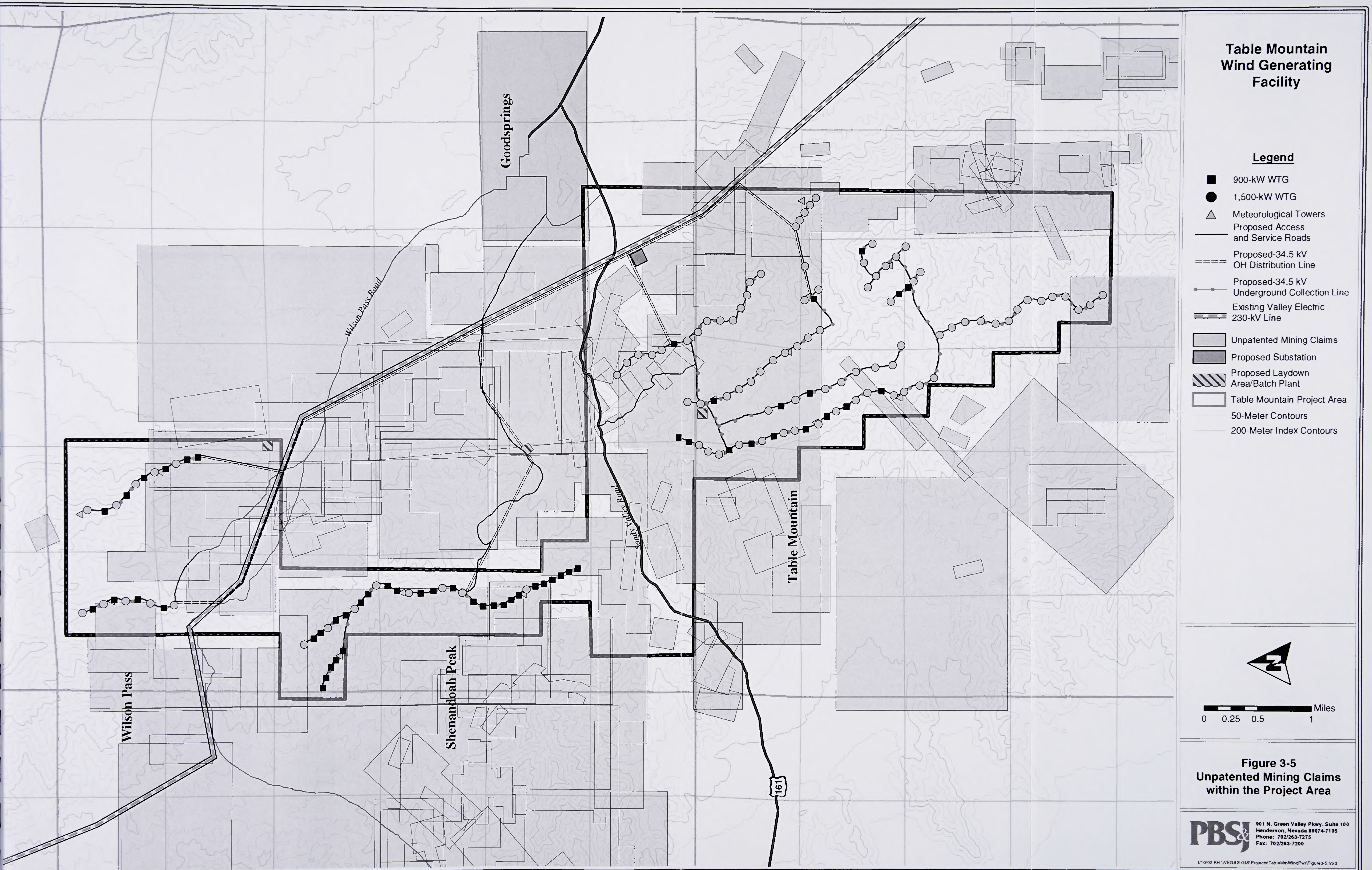

Figure 3-5
Unpatented Mining Claims within the Project Area

crossed by the access road to Shenandoah. None of the proposed WTGs or other facilities would be located on patented claims under the Proposed Action or Alternatives A and B. A total of 80 active mining claims and more than 870 closed mining claims are located within the project area and vicinity.

3.2 Surface Water Hydrology

The Table Mountain Project area is located in Watershed Region 16, the Great Basin Region, which discharges into the states of Utah and Nevada and includes parts of California, Idaho, Nevada, Oregon, Utah, and Wyoming. Specifically, it is located within the Central Nevada Desert Basins Subregion (Subregion 1606). This subregion is a closed desert basin that discharges into South Central Nevada and is located in Nevada and California. Within this subregion, is the Ivanpah-Pahrump Valleys Cataloging Unit 16060015 (USGS 2001). It is roughly 2,800 mi^2 in area, with a perimeter of approximately 350 mi. Figure 3-6 (p. 3-10) shows the approximate location of the affected watershed.

The watershed is generally characterized by hydrologic soil conditions and soil types that permit rainfall losses due to infiltration and absorption. The majority of the soils consist of extremely gravelly loam with some gravelly fine sandy loam, and rock outcrops. The soil is well-drained with permeability ranging from moderate in the extremely gravelly loams to moderately rapid in the very gravelly sandy loams. The hazard of erosion from water is slight to moderate and the wind erosion hazard is slight. Elevations within the project area range from approximately 3,800 ft above msl on Table Mountain to 6,070 ft above msl north of Wilson Pass. Steep-sided canyons and drainages of various sizes are found throughout the project area. All of the drainages within the project area are ephemeral, flowing only after storm events. Two springs, Cave Spring and North Cave Spring, are located in the northern portion of the project north of Wilson Pass. A water catchment facility (guzzler) was constructed in Deadmans Canyon on Table Mountain by the Nevada Division of Wildlife (NDOW) and volunteers. These are the only natural water sources known to occur in the project area. The location of these water sources is shown on Figure 3-7 (p. 3-11).

The Federal Emergency Management Agency (FEMA) is charged with flood mapping, management, and safety. According to the FEMA Flood Insurance Rate Maps (FIRM) for the area, the proposed WGF site is not located within the 100-year floodplain or the 500-year floodplain of any waterway (FEMA 1995a, 1995b, 1995c).

3.3 Groundwater Resources

The project area is located in the southern part of the Great Basin Regional Aquifer System (Great Basin) or the "Basin and Range Aquifers" of the United States, which includes most of Nevada and portions of adjacent states (Schaefer and Harrill 1995; USGS 2001a) (Figure 3-8, p. 3-12). The physiography and geologic structure of the Great Basin is characterized by north-south trending mountain ranges and intervening structural basins generally formed by extensional faulting.

The hydrogeology of the Great Basin is controlled by the basin-and-range geologic structure and climate, and groundwater flow patterns in the region are generally complex. The "carbonate rock province" is that part of the Great Basin in which groundwater flow may be strongly influenced or dominated by carbonate rocks of Paleozoic age, with interbasin flow between hydrographic basins often recognized (Harrill et al. 1988).

Hydrogeologic units in the southern Great Basin are (1) metamorphic, igneous, and sedimentary rocks of Precambrian and early Cambrian age, (2) carbonate and clastic sedimentary rocks of middle Cambrian to early Triassic age, (3) sedimentary and igneous rocks of middle Triassic to Quaternary age, (4) older basin-fill deposits of Miocene and Pliocene age, and (5) younger basin-fill deposits of Pliocene to Holocene age. The [illegible] more than 5[illegible] [illegible]

3.2 Surface Water Hydrology

The Table Mountain Project [illegible] and Wyoming [illegible] Nevada and California [illegible] shows the approximate [illegible]

The watershed [illegible]

The Federal Emergency Management Agency [illegible]

3.3 [illegible]

The project [illegible]

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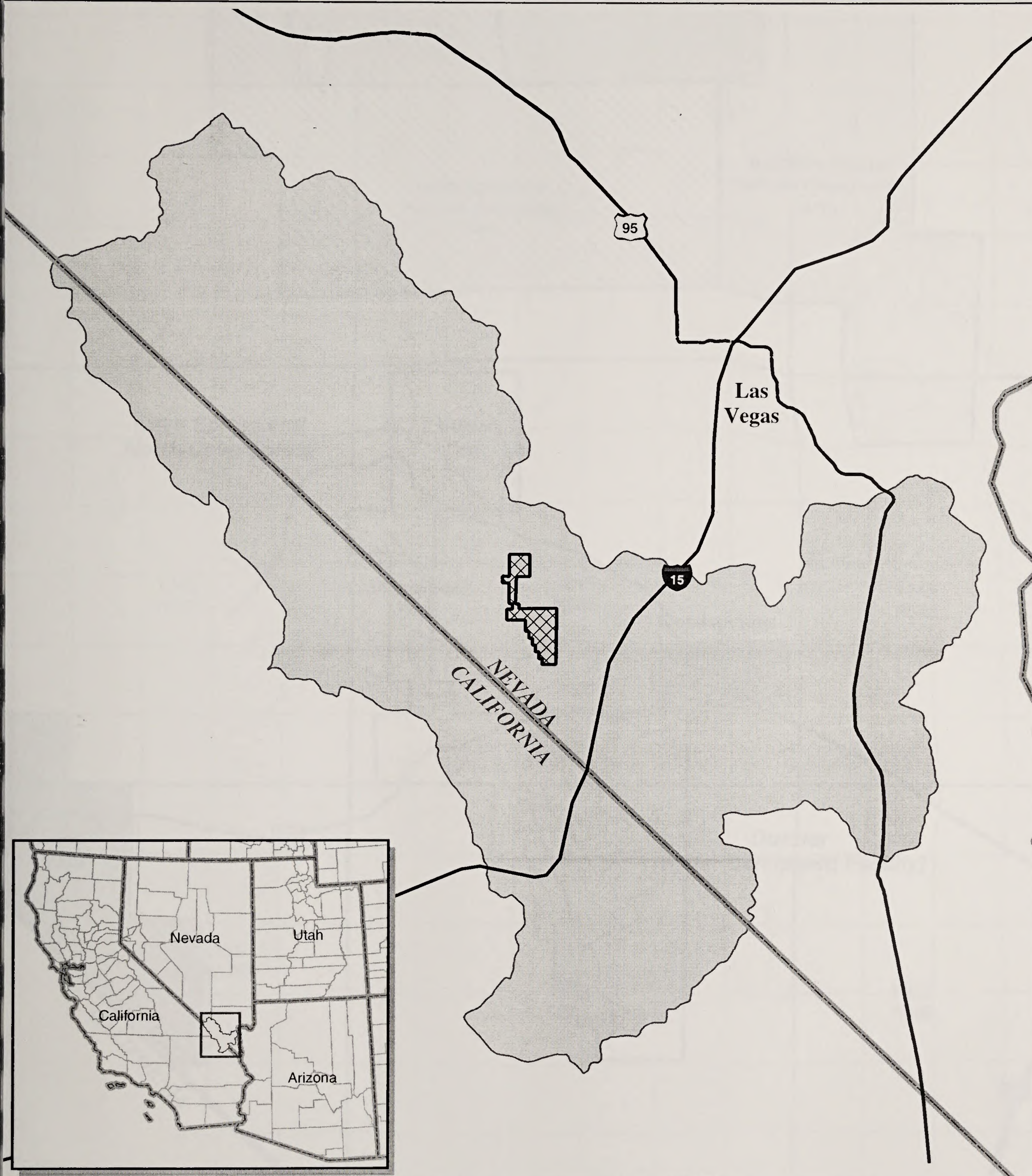

Miles
0 4.5 9 18

Source: Clark County (GISMO)

Table Mountain Wind Generating Facility

Legend

- Table Moutain Project Area
- Ivanpah & Pahrump Valleys Watershed
- Roads
- County Boundary

Figure 3-6
Affected Watershed within the Project Area

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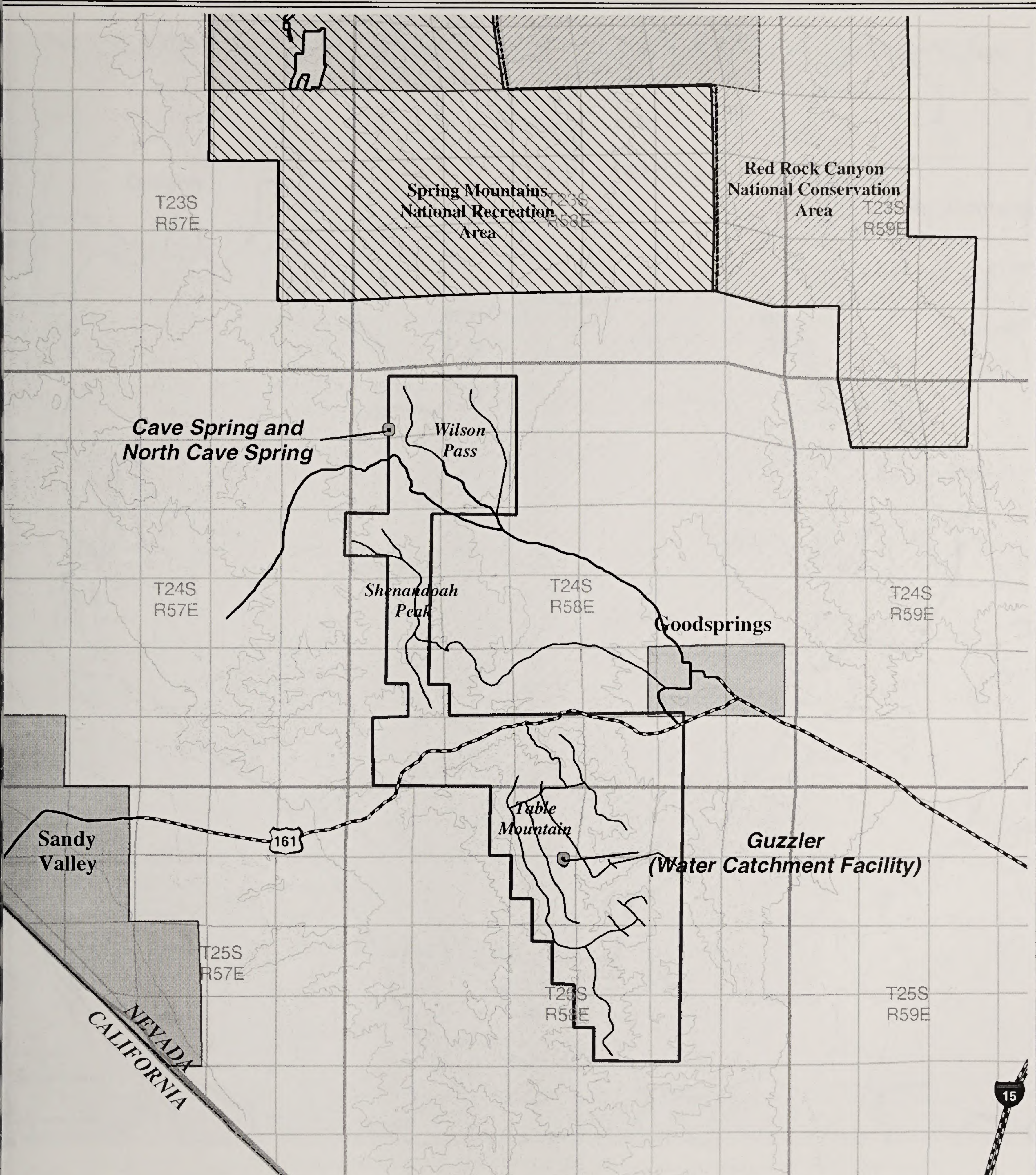

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0 0.5 1 2 Miles

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Legend

Table Moutain Project Area

50-Meter Contours

200-Meter Index Contours

Proposed Access and Service Roads

Figure 3-7
Surface Water Features Located within the Project Area

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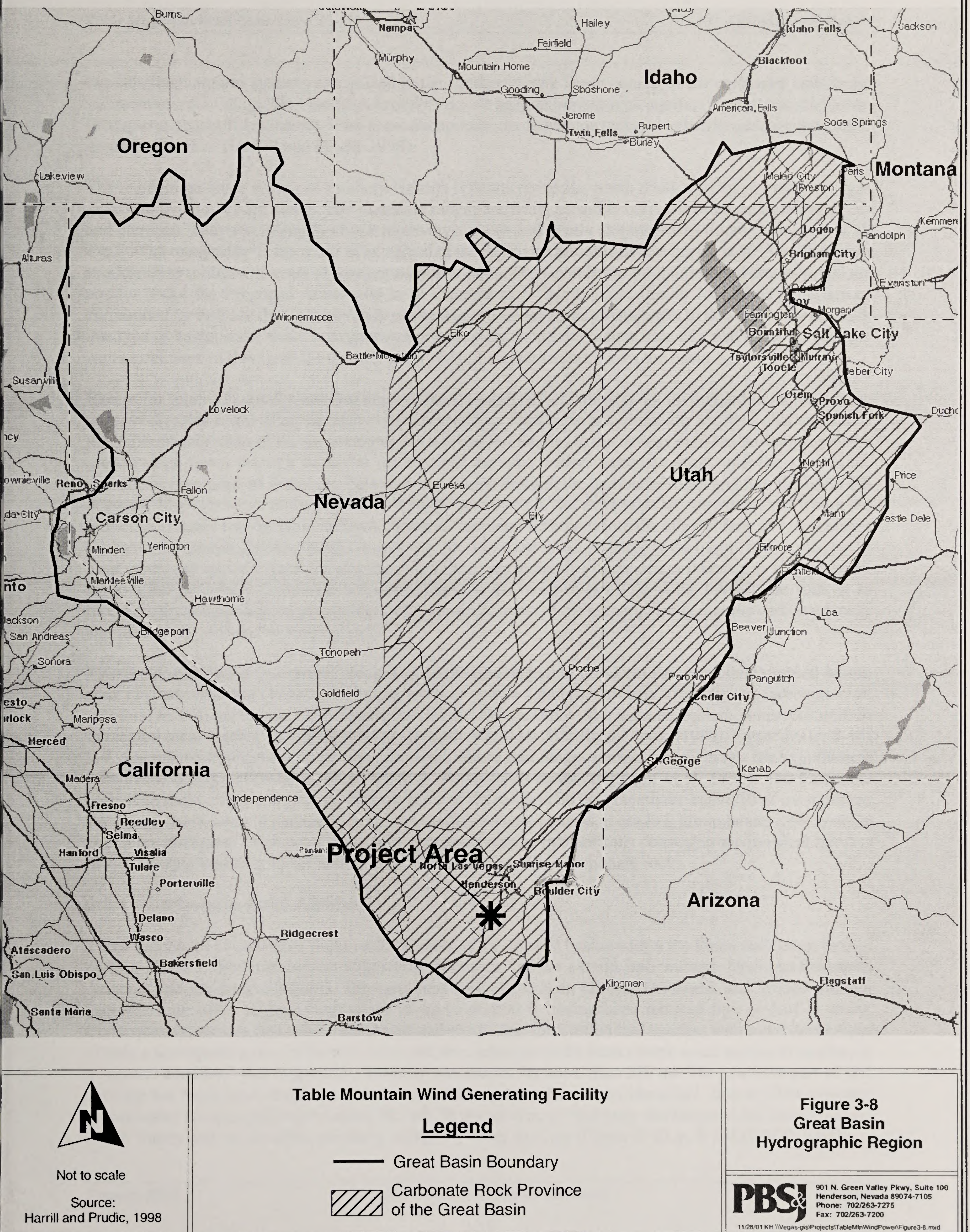

Table Mountain Wind Generating Facility

Legend

Great Basin Boundary

Carbonate Rock Province of the Great Basin

Figure 3-8
Great Basin Hydrographic Region

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two dominant aquifer systems recognized in the southern Great Basin consist of the carbonate and clastic sedimentary rocks of middle Cambrian to early Triassic age (carbonate-rock aquifers) and permeable basin-fill deposits (basin-fill aquifers). With some exceptions, the remaining units act as barriers or impediments to groundwater flow (Harrill and Prudic 1998).

The regional geologic setting of southern Nevada is characterized by north-south trending mountain ranges separated by intervening basins. The mountain ranges are steep, generally bare, and often cut by deep ravines and canyons. They rise abruptly above relatively smooth and gently sloping basin floors (Longwell et al. 1965). The topography is the result of extension of the region at various times during the past 35 million years in addition to millions of years of weathering and erosion. The Great Basin exhibits internal drainage, and the aquifer under the Proposed Action site is an example of a "partly closed basin," which is underlain or surrounded by bedrock that is moderately permeable and allows some groundwater to flow out of the basin. In this type of basin, some water is evaporated or transpired at the upgradient side of a playa, but most of the water continues to flow past the downgradient side of the playa and leaves the basin.

Except for relatively small areas that drain to the Colorado River, water is not discharged to major surface water bodies, but is lost solely through evapotranspiration. Each basin has essentially the same characteristics: the impermeable rocks of the mountain ranges serve as boundaries to the flow system and the majority of the groundwater flows through basin-fill deposits. In the area where carbonate rocks underlie the basins, substantial quantities of water can flow between basins through the carbonate rocks and into the basin-fill deposits. Most recharge to the basin-fill deposits originates in the mountains as snowmelt, and where the mountain streams emerge from bedrock channels, the water infiltrates into the alluvial fans and replenishes the basin-fill aquifer. Intense thunderstorms may provide some direct recharge to the basin-fill deposits, but in most cases, any rainfall that infiltrates the soil is either immediately evaporated or taken up as soil moisture. Little water percolates downward through the unsaturated zone to reach the water table in the valleys. In mountain areas underlain by permeable carbonate rocks, most of the recharge may enter the carbonate rocks and little water remains to supply runoff.

Two dominant aquifer systems are recognized in the eastern part of the Great Basin and the Proposed Action area: (1) carbonate and clastic sedimentary rocks of middle Cambrian to early Triassic age (carbonate-rock aquifers) and (2) permeable basin-fill deposits (basin-fill aquifers). With some exceptions, other rock units in the region act as barriers or impediments to groundwater flow (Harrill and Prudic 1998). Figure 3-9 (p. 3-14) is a generalized hydrogeologic section across the basins and ranges terrain, which shows the hypothetical subsurface configuration of aquifers and low permeability rocks (Dettinger et al. 1995). The Paleozoic carbonate rocks either compose or underlie most of the ranges and lie beneath the basin-fill of most basins. Because a single layer of carbonate rocks may underlie several basins, it can link groundwater flow systems over large distances. The basin-fill deposits may or may not be hydraulically connected to equivalent aquifers in neighboring basins or to the underlying or adjacent Paleozoic carbonate rocks.

3.3.1 Carbonate-Rock Aquifer

Thick sequences of carbonate rocks underlie most of the alluvial basins within the Basin and Range area in eastern Nevada and southeastern California. These rocks also extend into western Utah, northwestern Arizona, and southeastern Idaho. The carbonate rocks have been faulted, deformed, and eroded through geologic time, with original thicknesses of up to 40,000 ft having been reduced by one-half or more. Consequently, most of these rocks are in isolated blocks that form individual aquifers with aerial dimensions of only a few square miles. In Nevada, however, the carbonate rocks form a north-south section of aquifer, or a "central corridor," that is generally laterally continuous for more than 250 mi. The southern part of this corridor has been most studied, and two major flow systems have been identified. In both flow systems, groundwater is recharged in east-central Nevada. In one system, groundwater discharges at Ash Meadows and Death Valley and, in the other, primarily at Muddy River Springs (Figure 3-10, p. 3-15) (USGS 2001b).

[illegible]

[illegible]

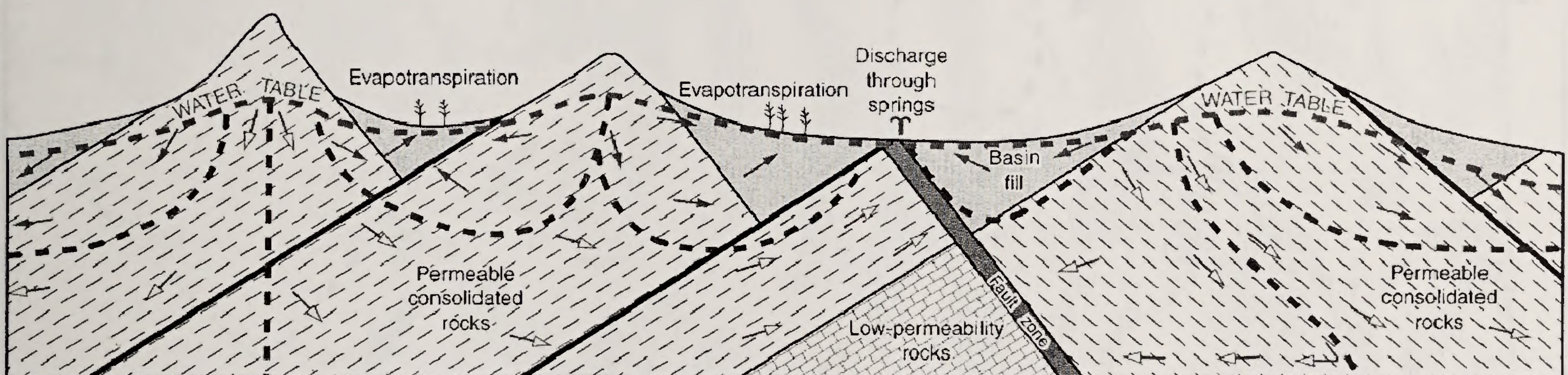
[illegible]

[illegible]

[illegible]

[illegible] Carbonate Rock Sites

[illegible]



Source:
Harrill and Prudic, 1998

Table Mountain Wind Generating Facility

Legend

- Flow Region Boundary
- Direction of Flow (deep groundwater)
- Direction of Flow (shallow groundwater)

Figure 3-9
Schematic Hydrogeologic Section of Basin and Range Groundwater Flow

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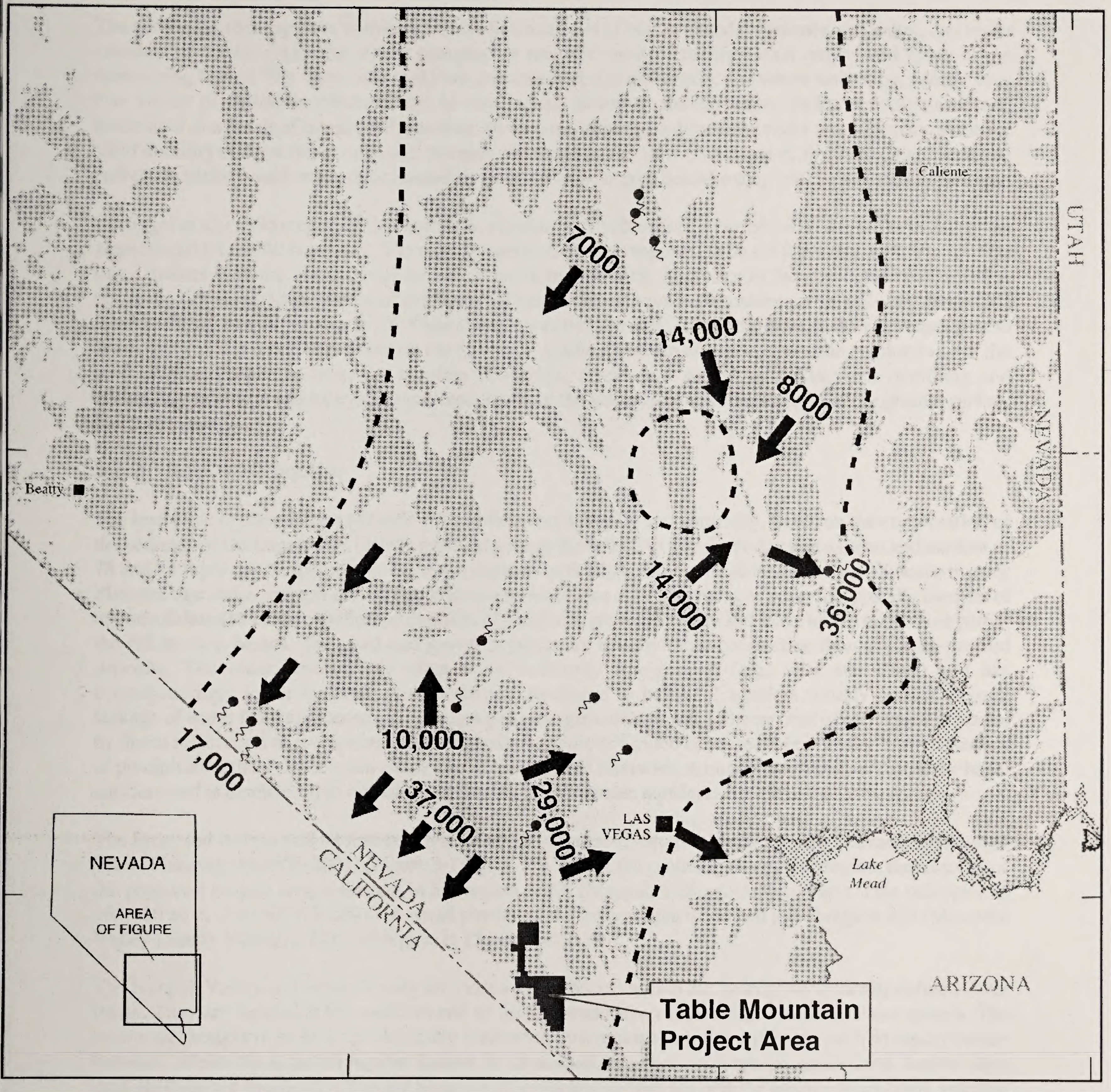

Not to scale

Source: USGS RASA Prof. Paper 1409-A, 1998

Table Mountain Wind Generating Facility

Legend

- Basin Fill
- Consolidated rock
- Boundary of central corridor of thick carbonate rocks - Approximately located
- 14,000 — Generalized direction and rate of groundwater flow in carbonate-rock aquifers - Number is flow rate, in acre-feet per year. Based on deuterium mass-balance mixing models
- 17,000 — Spring discharging from carbonate-rock aquifer - Number is discharge, in acre-feet per year

Figure 3-10
Groundwater Flow in Carbonate-rock Aquifers of Southern Nevada

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The carbonate-rock aquifers within the Great Basin consist of consolidated limestones, dolomites, and lesser amounts of clastic rocks that either compose or underlie most of the mountain ranges and many of the intervening basins. The carbonate rocks are commonly dense and brittle, and where unbroken, exhibit very low values of hydraulic conductivity. In most areas, however, the carbonate rocks were fractured and brecciated as a result of intense deformation. Most noncarbonate sedimentary rocks would reconsolidate or yield ductility and not retain openings through which water can flow (Dettinger et al. 1995). In contrast, the carbonate rocks would retain their secondary permeability, in part because they are slightly soluble in water.

Dettinger et al. (1995) reported that hydraulic conductivity values for fractured carbonate rocks in the region were from 0.01 to 940 ft per day. The median conductivity was reported to be 4.5 ft per day, which is 430,000 times greater than the conductivity of unbroken carbonate rock. Recharge to the carbonate rock aquifers occurs by downward percolation of precipitation into rock fractures in the mountain ranges or by downward leakage through overlying basin fill. Once the water enters the rock, it would generally flow downgradient to discharge areas at a rate dependent on the hydraulic gradient and the effective hydraulic conductivity of the rock. Water discharges from the aquifers at springs, rivers, and wells; by leaking into overlying and underlying aquifers; and by evapotranspiration where the water table is sufficiently near the ground surface (such as playas).

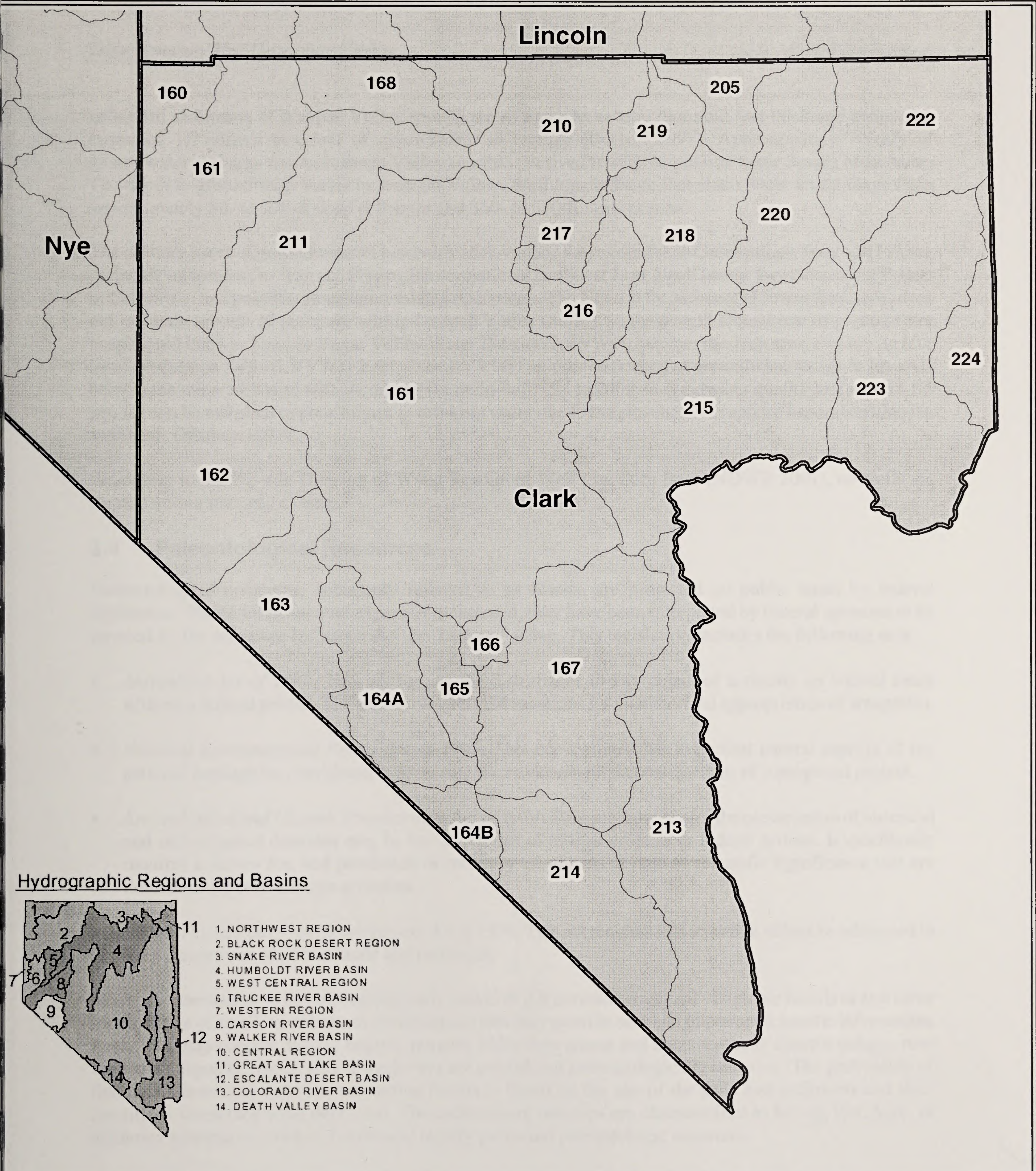
3.3.2 Basin-Fill Aquifer

The hydraulic conductivities of basin-fill aquifers vary laterally and vertically, based on the composition of the sediments. Dettinger et al. (1995) reported a range from 0.02 to 140 ft per day and a mean and median of 78 and 83 ft per day, respectively. Basin-fill deposits typically consist of an older unit of late Miocene to early Pliocene age and a younger unit of late Pliocene to Holocene age. The younger basin fill typically consists of unconsolidated to semiconsolidated deposits of sand, silt, gravel, and clay and make up the uppermost part of the fill in most basins. The sand and gravel deposits are usually more conductive than the finer-grained deposits. The older basin fill is often more uniformly fine-grained (e.g., silts and clays) and has correspondingly lower hydraulic conductivities. Recharge to basin-fill aquifers usually occurs through leakage of water from carbonate aquifers along the margins of the basins. The amount of recharge that occurs by direct infiltration of precipitation on the aquifer outcrop is limited because there is a very limited amount of precipitation that falls at basin elevations in the region. Otherwise, groundwater travels through the basin aquifers and is discharged in a manner similar to the carbonate aquifers.

The Proposed Action and alternatives are located in Central Hydrographic Region 10 (Nevada Division of Water Planning [NDWP] 2001) (Figure 3-11, p. 3-17). Within the central hydrographic region, the majority of the proposed project area is located in Subregion 164A (Ivanpah Valley/Northern Part). This subregion is 161,920 ac in size (NDWP 2001). A small portion of the project area is located in Subregion 163 (Mesquite Valley [Sandy Valley]). This subregion is 151,040 ac in size.

The Ivanpah Valley and Sandy Valley are closed desert basins within the hydrogeographically defined Great Basin. They are located at the southern end of the Colorado River regional groundwater flow system. The basins are thought to be hydrogeologically connected by a regional aquifer within the underlying carbonate bedrock. While the regional aquifer cannot be described as either confined or unconfined, limited data indicate there are locations where the behavior of wells and springs suggest the aquifer is confined, whereas the opposite may be indicated at another location (Dettinger et al. 1995).

The groundwater recharge estimate for the Ivanpah Valley is approximately 2,200 acre-feet per year (afy) (Harrill et al. 1988). Groundwater occurs in the valley-fill deposits and in fractures and solution cavities within the deeper carbonate bedrock of the regional aquifer system. In Ivanpah Valley, the hydraulic connection between the basin fill and the underlying carbonate rocks is probably good (Burbey 1997). The



Not to scale

Source: Base map - US Geological Survey Carson City, NV

Table Mountain Wind Generating Facility

Legend

000 Hydrographic area number

Figure 3-11
Clark County, Nevada
Hydrographic Regions

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valley-fill sediments of Ivanpah Valley (north) are as much as several thousand feet thick and contain an estimated 1.7 million acre-feet of groundwater in storage (Burbey 1997). Approximately 700 afy of groundwater recharge for the Ivanpah Valley (north) is derived from precipitation in the Spring Mountains. The depth to groundwater varies in Ivanpah Valley. Well logs indicate that static water levels range from approximately 80- to 200-ft deep at Primm and 360- to 570-ft deep in Jean.

The primary users of groundwater in Ivanpah Valley include the residences in Goodsprings, Jean, and Primm, casino developments in Jean and Primm, the correctional facility at Jean, a golf course located south of Primm in California; and possibly some mine-related operations. The Nevada Department of Water Resources does not maintain records of pumpage within Ivanpah Valley (north), so the overall annual rate of groundwater usage is not known. The Las Vegas Valley Water District (LVVWD) services the Jean area, employing four local production wells (LVVWD 2001). The LVVWD records indicate that groundwater usage at Jean has been in the range of 544 to 690 afy during the period of 1995 to 2000. Groundwater quality in the basin-fill aquifer can be marginal to poor for use as drinking water due to the presence of evaporite minerals within the sediments (Burbey 1997).

According to the Nevada Division of Water Resources Well Log Data Base (NDWR 2001), no wells are located within the project area..

3.4 Paleontological Resources

Paleontological resources, commonly referred to as fossils, are protected on public lands by federal legislation. Where fossils are not expressly mentioned, they have been interpreted by federal agencies to be covered by the reference to "scientific" or "historic" value. This legislation includes the following acts:

- *Antiquities Act of 1906.* This act forbids the disturbance of any object of antiquity on federal lands without a federal permit. The act also established sanctions for unauthorized appropriation of antiquities.

- *National Environmental Policy Act of 1969.* This act requires that important natural aspects of the national heritage be considered in assessing the environmental consequences of a proposed project.

- *Archeological and Historic Preservation Act of 1974.* This act provides for the preservation of historical and archeological data that may be lost as a result of federal projects or federal actions. It specifically requires a survey for, and protection or recovery of, objects or data of scientific significance that are threatened by construction activities.

- *Federal Land Policy and Management Act of 1976.* This act requires that scientific values be addressed in the management of public lands and resources.

An area is considered to be paleontologically sensitive if it contains abundant vertebrate fossils or few other fossils (large or small, vertebrate or invertebrate) that may provide new and important scientific information. Areas that may contain datable organic remains older than recent and areas that may contain unique, new vertebrate deposits, traces, and/or trackways are considered paleontologically sensitive. The probability of finding sediments or outcrops containing fossils is based on the age of the soils and sediments and their conditions when they were deposited. The sedimentary outcrops are characterized as having low, high, or unknown potential to contain fossils and legally protected paleontologic resources.

- *Low potential.* These sediments and rock units were originally deposited in an environment or energy regime that was not conducive to fossil formation. Previous studies in these areas typically documented a lack of fossils or only inconsequential and fragmentary fossil remains. These soil units are not likely to yield any fossil remains noteworthy to science.

[illegible]

The primary means of [illegible]

[illegible]

2.4 Paleontological Resources

Paleontological [illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

- *High potential.* Sedimentary units with a high potential for containing important nonrenewable paleontologic resources are determined to have high paleontologic sensitivity. In these cases, the sedimentary rock unit contains a high density of recorded vertebrate fossil sites, has produced vertebrate fossil remains in the near vicinity of the project area, and is very likely to yield additional remains during excavation associated with project development.

- *Unknown potential.* These deposits and formations of rock unit have limited exposure(s) in the project area, are poorly studied, and may not have many recorded paleontologic resource localities. However, in other areas, the same or a similar rock unit may contain sufficient paleontologic resource localities to suggest that exposures of the unit in the project area would have at least a moderate potential for yielding fossil remains.

During construction, there exists the potential to encounter paleonotological resources within the proposed project area. These resources would most likely occur in distinct geologic units, Pleistocene cave deposits, Pleistocene woodrat middens (*Neotoma* sp.) and/or quaternary alluvium. A discussion of these environments follows.

The six potentially fossil-bearing sedimentary units identified in the project area are Goodsprings Dolomite, Sultan Limestone, Monte Cristo Limestone, Bird Spring Formation, Volcanics, and Quaternary Alluvium.

3.4.1 Geologic Units

3.4.1.1 Goodsprings Dolomite

The Goodsprings Dolomite consists of a monotonous sequence of thin-bedded, light- to dark-grey mottled dolomite, with a 50- to 75-ft layer of dolomitic limestone and sandy shale present near the top of the formation locally. Analysis of fossils recovered by Hewett (1931) suggests that the Goodsprings Dolomite ranges in age from the later Cambrian period to the Devonian period. Hazzard and Mason (1953) reported that the vast majority of the formation as exposed near Goodsprings dated to the middle Cambrian, with overlying beds of Devonian age separated from the older deposits by an unconformity. These authors also recognized in the Goodsprings area two units of the Goodsprings Dolomite that, about 50 mi to the southwest, were assigned the names Bonanza King Formation and Cornfield Springs Formation. The lower portion of the former unit dates to the middle Cambrian period, while the upper portion of the Bonanza King Formation and the entirety of the Cornfield Springs Formation date to the late Cambrian (Palmer and Hazzard 1956).

3.4.1.2 Sultan Limestone

The Sultan Limestone, of Devonian age, has been subdivided into three members: the basal Ironside Dolomite Member, the middle Valentine Limestone Member, and the upper Crystal Pass Limestone Member. The Ironside Dolomite Member is dolomite in composition, the Valentine Limestone Member ranges in composition from nearly all limestone at some localities to almost exclusively dolomite at others, and the Crystal Pass Limestone Member is virtually all limestone.

Fossils are not uniformly distributed throughout the Sultan Limestone. Hewett (1931) reported that the Ironside Dolomite Member contained relatively few fossils, although these were widespread throughout the member and could "be found with close search at most exposures" (Hewett 1931, p. 14). Fossils recovered from this member include corals (*Alveolites* sp., *Cladopora* sp., *Cyathophyllum* sp., *Diphyphyllum* sp., *Pachyphyllum woodmani*, *Stromatopora* sp., *Striatopora* sp., *Syringopora* sp., *Aulopora* sp.), brachiopods (*Atrypa missouriensis*, *A. reticularis*, *Cyrtia cyrtiniformis*, *Spirifer argentarius*), and infrequent gastropods (*Platyschisma mccoya*) (Hewett 1931). The overlying Valentine Limestone Member of the Sultan Limestone was distinguished by Hewett (1931) as having two distinct, alternating lithologies with differing fossiliferous potential: "beds of massive limestone 5- to 30-ft thick, which rather persistently bear a few fossils, and beds

- [illegible]

- [illegible]

[illegible]

[illegible]

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[illegible]

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[illegible]

[illegible]

of platy limestone, which show no trace of fossils" (Hewett 1931, p. 14–15). Fossils recovered from the massive limestone lithology of this member include coral (*Diphyphyllum* sp.), brachiopod (*Atrypa reticularis*), and gastropod (*Platyschisma mccoya*) (Hewett 1931).

3.4.1.3 Monte Cristo Limestone

Five members of the Monte Cristo Limestone have been recognized. The basal member, termed the Dawn Limestone Member, consists of thinly bedded, dark-grey limestone with some chert. Fossils are present in this member, appearing white against weathered surfaces. Taxa reported from this member by Hewett (1931) include corals, brachiopods, pelecypods, gastropods, and cephalopods.

Above the Dawn Limestone Member of the Monte Cristo Limestone is the Anchor Limestone Member, a limestone with abundant chert in thin layers and lenses that contains abundant fossils (Hewett 1931; Longwell et al. 1965) including: corals, echinoderms, bryozoans, brachiopods, pelecypods, and gastropods.

The Bullion Dolomite Member of the Monte Cristo Limestone overlies the Anchor Limestone member. This member, a massive, light-grey, coarse-grained limestone locally altered to dolomite and forming prominent whitish cliffs (Hewett 1931; Longwell et al. 1965), is less fossiliferous than the preceding two members, but nevertheless has yielded corals, echinoderms, bryozoans, and brachiopods (Hewett 1931).

The Arrowhead Limestone Member of the Monte Cristo Formation is a bluish-grey limestone in thin beds with some shale, overlying the Bullion Dolomite Member. Fossils are abundant from this member and include corals, echinoderms, bryozoans, brachiopods, pelecypods, gastropods, and crustacea.

Finally, the Yellowpine Limestone Member of the Monte Cristo Limestone is the uppermost subunit of the formation. This member is composed of dark-grey limestone in thick beds and forms prominent cliffs. Fossils are extremely sparse from this member, so much so that Hewett described none according to taxon, although such fossils as were recovered were presumed to date to the middle Mississippian (Hewett 1931, p. 19). However, a subsequent investigation (Moore 1991) has demonstrated that the Yellowpine Limestone Member is more abundantly fossiliferous than previously reported. Locality SBCM 01.001.029 yielded the Stateline Mine Fauna, a composite fauna including coelenterata, echinodermata, bryozoa, brachiopods, pelecypods, gastropods, arthropods, and crustacea.

3.4.1.4 Bird Spring Formation

The Table Mountain WGF site traverses outcrops of the fossiliferous Bird Springs Formation (Longwell et al. 1965). The basal portion of the Bird Spring Formation consists of sandstone, shale and thin limestone layers; these are overlain predominantly by limestone and dolomite. Layers of shale and sandstone also recur at many horizons. In addition, many of the formation's carbonate beds are impure and numerous zones are relatively thin-bedded, resulting in the formation on the whole being less resistant than the underlying Monte Cristo Formation (Longwell et al. 1965).

Exposures of the Bird Spring Formation have proven abundantly fossiliferous in southern Nevada. USGS has recorded several localities from the nearby Las Vegas Range that have produced marine fossil faunas (Longwell et al. 1965). The faunas from the Las Vegas Range have been dated to the Pennsylvanian and Permian periods of the Paleozoic era. In contrast, the faunas from the Meadow Valley Mountains have been tentatively dated to the later Mississippian period (Longwell et al. 1965).

3.4.1.5 Volcanics

Undifferentiated volcanic rocks dating to the early Cenozoic era and possibly to the Cretaceous period of the Mesozoic era have low potential to contain significant fossil resources.

[illegible]

3.4.1.2 Monte Cristo Limestone

Five members of the Monte Cristo Limestone [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

3.4.1.4 Bird Spring Formation

[illegible]

[illegible]

3.4.1.5 [illegible]

[illegible]

3.4.1.6 Quaternary Alluvium

Portions of the proposed Table Mountain WGF are also situated on sediments mapped by Longwell et al. (1965) as Recent and possibly Pleistocene alluvium (Qal). This alluvium has low potential to contain significant nonrenewable paleontologic resources. However, this alluvium may very well overlie undisturbed sediments of other fossil-bearing rocks units discussed above. Should such uneroded sediments be present at depth, they would have high paleontologic sensitivity. The alluvium could be encountered during construction of the proposed substation and associated underground cable routes. It is not likely this unit would be encountered on Table Mountain (which is predominantly comprised of volcanic) or on Shenandoah Peak of the Wilson Pass area (which is predominantly comprised of Bird Spring Formation).

3.4.2 Pleistocene Cave Deposits

There is potential to encounter fossil deposits that have accumulated in caves opened into the earlier limestone rocks. Such highly significant fossil accumulations, most of which date to the later Pleistocene epoch, have been previously reported from localities in or near the Goodsprings/Stateline region, including Kokoweef Cave in the Ivanpah Mountains, California (Goodwin and Reynolds 1989; Force 1991; Reynolds et al. 1991b; Scott 1997), Antelope Cave in the Mescal Range, California (Reynolds et al. 1991c; Scott 1997), and Devil Peak in the southern Spring Mountains, Nevada (Reynolds et al. 1991a). An early Holocene-age vertebrate fauna has also been reported from Quien Sabe Cave in the Ivanpah Mountains (Whistler 1991). These fossil accumulations, which are frequently of large size, exhibit significant species diversity, trend towards preservation of microvertebrates, and are cached in caves opened into the existing limestone; Kokoweef Cave, for example, developed as "a large, steeply dipping solution chamber etched along the brecciated zones parallel to the Clark Mountain Fault and near the contact of the ... Sultan Limestone and the ... Monte Cristo Limestone" (Reynolds et al. 1991b, p. 97).

3.4.3 Pleistocene Woodrat Middens

There is the possibility that woodrat middens, that is, plant middens amassed through many years by woodrats, may also be present within the area of potential effect. Woodrat middens have been known to accumulate through decades, centuries, and even millennia as successive generations of woodrats add collected plant matter to the midden. These middens can in some cases be valuable paleontologically in what they can provide:

- Sequences of well-preserved plant fossils that enable reconstructions of past climatic conditions
- Potentially, time-stratified sequences of radiometric dates that enable more accurate interpretations of paleoenvironmental change through time
- Occasionally, identifiable microfossil bones that permit comparisons with other, undated microfossil faunas to be advanced.

Woodrat middens have been previously employed to track climatic shifts and changes in plant distribution in the Great Basin and the Mojave Desert throughout the later part of the Pleistocene epoch (±40,000 B.P. to ±11,000 B.P.), as well as through much of the Holocene epoch (< 11,000 B.P.) (Van Devender 1977; Van Devender et al. 1987; Spaulding et al. 1990; Spaulding 1995). Such middens are therefore paleontologically sensitive. Woodrat Middens have been identified within the project area in caves and abandoned mines (Heindl 2001).

The staff of the Section of Geological Sciences, San Bernardino County Museum, conducted a review of the Regional Paleontologic Locality Inventory. The results of this review indicate that no paleontologic resource

3.4.1.6 [illegible]

[illegible]

3.4.2 [illegible]

[illegible]

3.4.3 [illegible]

[illegible]

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- [illegible]
- [illegible]

[illegible]

[illegible]

localities are recorded anywhere within the area of potential effect of the Table Mountain WGF. A more detailed discussion is provided in Appendix C.

3.5 Biological Resources

The Proposed Action area lies within the northeastern Mojave Desert. The Mojave is the smallest of the four North American deserts, lying primarily in California, but also including the southern quarter of Nevada and two small extensions into western Arizona (Larson 1977). It is bordered by the southern Sierra Nevada Mountains on the west, the Great Basin Desert to the north, the Colorado River to the east, and the San Bernardino Mountains and the Sonoran Desert to the south. The proposed project encompasses Table Mountain, Shenandoah Peak, and the area north of Wilson Pass in the Spring Mountain Range. This region of the Spring Mountains is geographically bounded by Goodsprings Valley on the east and Mesquite Valley on the west. The Spring Mountains are part of the BRP that comprises most of Nevada and portions of Utah, California, and Arizona. This physiographic province is characterized by a varied topography that consists of small, generally north-south trending mountain ranges (Figure 3-1, p. 3-2).

This region is marked by extreme conditions. The climate is arid, accompanied by extreme temperatures ranging from 20°F to more than 100°F. Overall precipitation is very low, with erratic rainfall patterns that tend to be localized. Distribution of vegetation is strongly influenced by variations in elevation and soil.

PBS&J biologists conducted biological field surveys over 100% of the area encompassing the Proposed Action and Alternatives A and B, including ancillary facilities and access road alternatives, during April and May 2001. Additional field surveys were conducted in November 2001 to assess habitats occurring along a new access road to Shenandoah Peak and the proposed substation relocation one-quarter of a mile west of the existing VEA Mead-Pahrump 230-kV transmission line.

3.5.1 Vegetation

Vegetation surveys were performed by teams of biologists walking parallel transects spaced approximately 50 ft apart. Surveys along the proposed WTG strings covered a minimum of a 200-ft corridor. A 100-ft-wide corridor was surveyed for the proposed distribution line corridors. A 60- to 100-ft-wide corridor was surveyed along new access road locations, and a 30-ft-wide survey was conducted along the edges of existing roads that are to be widened. All laydown areas had 100% coverage by walking parallel transects. Field surveys of the new substation location and new access road to Shendoah Peak were performed outside the accepted timeframe for sensitive plant surveys; therefore, surveys of these two areas focused on assessing habitat for sensitive species and estimating cacti and yucca numbers. A total of approximately 700 ac were surveyed for plant species.

During field surveys of the Proposed Action and Alternatives A and B, biologists identified a total of 187 plant taxa representing 43 families. A list of all plant species observed during the field surveys is presented in Appendix D. Four plant communities are represented in the project area including Mojavean blackbrush scrub, Mojave wash scrub, Mojave creosote bush scrub, Mojavean pinyon-juniper woodlands. The variation in the plant species throughout the project area is related to the change in elevation, soil, topography, and drainage patterns. The majority of the project area is above 4,500 ft msl; however, the elevation ranges from approximately 3,780 ft above msl north of Crystal Pass to 6,070 ft msl north of Wilson Pass. The topography ranges from rolling to extremely steep with slopes that exceed 75% in some areas. The majority of the WTGs would be located along ridges to optimize the exposure to wind. Blackbrush scrub communities dominate these ridges. The four plant communities occurring in the project area are discussed below.

[illegible]

3.5 Biological Resources

[illegible]

[illegible]

[illegible]

3.5.1 Vegetation

[illegible]

[illegible]

3.5.1.1 Plant Communities in the Project Area

Mojavean Blackbrush Scrub. Mojavean blackbrush scrub dominates the proposed project area above 4,000 ft msl. The plants typically consist of low, often intricately branched shrubs that are 1.5 to 3 ft tall and occur on dry, well-drained slopes and on flats that are shallow, often calcareous, soils with very low water-holding capacity. The community is named for the shrub blackbrush (*Coleogyne ramosissima*), which dominates this assemblage. Generally, this community type occurs between 4,000 and 7,000 ft above msl and often integrades with Great Basin sagebrush scrub, Joshua tree woodland, or pinyon-juniper woodlands (Holland 1986). Within the project area, blackbrush scrub occurs on the mountaintops, ridges, mountain slopes, and upper bajadas.

On Table Mountain, Joshua trees (*Yucca brevifolia*) and dwarf Joshua trees (*Yucca brevifolia* var. *jaegeriana*) are the most abundant species. Dominant shrubs include blackbrush, Shockley goldenhead (*Acamptopappus shockleyi*), desert tomato (*Lycium andersonii*), spiny menodora (*Menodora spinescens*), Nevada ephedra (*Ephedera nevadensis)*, desert plume (*Stanleya pinnata*), fourwing saltbush (*Atriplex canescens*), cliff rose (*Purshia mexicana*), and winterfat (*Krascheninnikovia lanata*). The dominant herbaceous species are California buckwheat (*Eriogonum fasciculatum polifolium*), skeleton weed (*E. deflexum* var. *deflexum*), and woolly Hermann buckwheat (*E. heermannii* var. *floccosum*). Mojave prickly pear cactus (*Opuntia erinacea* var. *erinacea*), beehive cactus (*Escobaria vivipara desertii*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and Mojave mound cactus *(Echinocereus triglochidiatus*) are the dominant cacti.

Common shrubs along the Shenandoah Peak ridgeline are big sagebrush (*Artemisia tridentata*), spiny menodora, and green ephedra (*Ephedra viridis*). On extensive slabs of limestone and exposed ridges, Utah agave (*Agave utahensis*), yellow cryptantha (*Cryptantha confertifolia*), and cottontop cactus (*Echinocactus polycephalus* var. *polycephalus*) were common. On the slopes below the ridges and on the upper bajadas, the community consists of a high diversity of species, including Joshua tree, Mojave yucca (*Yucca schidigera*), banana yucca (*Y. baccata*), spiny menodora, desert tomato, Nevada ephedra, Shockley goldenhead, cheesebush (*Hymenoclea salsola*), spiny hopsage (*Grayia spinosa*), and fourwing saltbush.

North of Wilson Pass, Joshua tree, Mojave yucca, and banana yucca comprise the overstory. Dominant shrub species include apache plume (*Fallugia paradoxa*) and turpentine broom (*Thamnosma montana*), while Parish golden-eye (*Viguiera parishii*) and California buckwheat dominate the herbaceous layer. Dominant cacti include Mojave prickly pear and beehive cactus. This community integrates with Mojavean pinyon-juniper woodlands community at elevations above 5,600 ft msl near the northern terminus of the project area.

Mojave Creosote Bush Scrub. The proposed project area supports a Mojave creosote bush scrub community at the lower elevations northeast of Table Mountain. Mojave creosote bush scrub is a widespread plant community and the most common type found in the Mojave Desert below about 4,000 ft above msl (Holland 1986; Rowlands et al. 1982; Vasek and Barbour 1977). It is characterized by widely spaced shrubs that are 2 to 8 ft tall. Creosote bush (*Larrea tridentata*) and burro bush (*Ambrosia dumosa*) often are the codominants in this community type. This community is dominated by creosote bush, burro bush, Nevada ephedra, range ratany (*Krameria parvifolia*), winterfat, prince's plume (*Stanleya pinnata*), red brome (*Bromus rubens*), desert larkspur (*Delphinium parishii*), and globe mallow (*Sphaeralcea ambigua*). Mojave yucca and Joshua trees comprise the overstory. Cacti in these areas include cottontop cactus (*Echinocactus polycephalus*), silver cholla (*Opuntia echinocarpa*), beavertail cactus, Mojave prickly pear, and beehive cactus.

Mojave creosote bush scrub vegetation transitions to blackbrush scrub at elevations near 4,000 ft above msl. The replacement of white bursage by blackbrush typically demarcates this ecotonal boundary. This transitional zone is comprised of plant species from both assemblages and includes creosote bush, blackbrush, Joshua tree, Mojave yucca, sweetbush (*Bebbia juncea*), spiny menodora, desert tomato, Nevada ephedra, green ephedra, Shockley goldenhead, cheesebush, spiny hopsage, fourwing saltbush, Pima ratany (*Krameria erecta*), burro bush, turpentine broom, Apache plume, Mojave sage (*Salvia mohavensis*), blue sage (*Salvia*

3.8.1.1 Plant Communities [illegible]

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dorrii), desert marigold (*Baileya multiradiata*), and desert tobacco (*Nicotiana obtusifolia*). In addition to the cacti noted to occur in the creosote scrub community, species inhabiting the transitional zone include hedgehog cactus (*Echinocereus engelmannii*) and barrel cactus (*Ferocactus cylindraceus* var. *lecontei*).

Wash Scrub. In the project area, the wash scrub community is generally comprised of species from the adjacent communities, but tends to have higher plant density and support greater species diversity than the adjacent areas. The wash scrub community occurs in Deadmans Canyon, Keystone Wash, the washes east and northeast of Shenandoah Peak near Yellow Pine, Pilgrim, and Cosmopolitan mines. Common plants within this community type include paper-bag bush (*Salazaria mexicana*), cheesebush, blackbrush, Joshua tree, Mojave yucca, green ephedra, desert tomato, Nevada ephedra, creosote bush, and blue sage, apache plume, matchweed (*Gutierrezia microcephala*), desert almond, and scented beardtongue (*Penstemon palmeri*). Common plants in the drainages, which bisected the bajadas, include apache plume, desert almond (*Prunus fasciculata*), and scented beardtongue.

Mojavean Pinyon-Juniper Woodland. Mojavean pinyon-juniper woodlands are open woodlands codominated by singleleaf pinyon (*Pinus monophylla*) and one of several species of juniper (*Juniperus* sp.), with an open shrubby understory of species commonly found in adjacent communities. It occurs in desert mountain ranges, usually between 4,000 and 8,000 ft above msl.

A small area of Mojavean pinyon-juniper woodland occurred at the extreme northern end of the project area near Wilson Pass and Mount Potosi. The vegetation in this area is dominated by singleleaf pinyon and Utah juniper (*Juniperus osteosperma*). Dominant woody shrubs include blackbrush and cliff rose, and the herbaceous vegetation includes California buckwheat.

3.5.1.2 Noxious Weeds

"Noxious weed" is defined as any species of plant that is, or is likely to be, detrimental or destructive and difficult to control or eradicate (NRS 555.005). Noxious weeds have become a growing concern in the United States and in southern Nevada because they can increase in cover relative to surrounding vegetation and exclude native plants from an area. The spread of noxious weeds has resulted in substantial economic impacts on some sectors of the state. Recognizing these impacts, the BLM established a goal that NEPA documents consider and analyze potential for weed spread and preventative rehabilitation measures for each management action involving surface disturbance. Noxious weeds with the potential to occur in the area of the Proposed Action and alternatives are listed in Table 3-1 (p. 3-25).

3.5.1.3 Threatened, Endangered, and Other Sensitive Plant Species

Endangered, threatened, and other sensitive plant species that may potentially occur in the project area were identified from the Nevada Natural Heritage Program and the USFWS and are presented in Table 3-2 (p. 3-25). None of the species presented in Table 3-2 (p. 3-25) are federally listed as endangered or threatened. All but one of the species in Table 3-2 (p. 3-25) are federal species of concern (SOC), and two are listed by the state of Nevada as "critically endangered" and by the BLM as "sensitive." Additionally, eight of the taxa presented in Table 3-2 (p. 3-25) are covered species in the Clark County Multiple Species Habitat Conservation Plan (MSHCP). As a signatory to the MSHCP, the BLM has management responsibilities to those species covered in the MSHCP. A brief habitat description for those species listed in Table 3-2 (p. 3-25) is provided in the following pages.

Rough Angelica. Rough angelica (*Angelica scarbrida*) is a federal SOC that is endemic to the Spring Mountains. The species occurs in mixed conifer plant communities near springs, on moist gravelly soils of washes, ephemeral streams, gullies, montane slopes, and avalanche chutes. It also occurs along wash margins in riparian woodlands and shrublands at lower elevations and along stream courses and adjacent overbank areas at higher elevations. The major threats to this species include habitat degradation and fragmentation and competition and encroachment of exotic species. This species is not expected to occur in the project area.

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Table 3-1. Noxious Weeds with the Potential to Occur in the Table Mountain Project Area.

Common Name	Latin Name
Russian knapweed	*Acroptilon repens*
Spotted knapweed	*Centaurea masculosa*
Tall whitetop	*Lepidium latifolium*
Puncturevine	*Tribulus terrestris*
Johnsongrass	*Sorghum halepense*
Yellow star thistle	*Centaurea solstiltialis*
Sow thistle	*Sonchus arvensis*
Musk thistle	*Carduus nutans*
Scotch thistle	*Onopordum acanthium*
Dalmatian toadflax	*Linaria dalmatica*
Hoary cress	*Cardaria draba*
White horse-nettle	*Solanum elaeagnifolium*
Camelthorn	*Alhagi camelorum*
Purple loosestrife	*Lythrum salicaria*

Source: Rafferty and O'Brien; NRS 555.010; Deuser 2000.

Table 3-2. Federal, State, and BLM Sensitive Plant Species with the Potential to Occur in the Table Mountain Project Area.

Plant Species		Status		
Scientific Name	**Common Name**	**USFW**	**NV**	**BLM**
Angelica scarbrida[a]	Rough Angelica	SOC[b]	—	N[c]
Arctomecon californica[a]	Las Vegas Bearpoppy	SOC	CE[d]	S[e]
Arctomecon merriamii[a]	White Bearpoppy	SOC	—	N
Astragalus funereus	Black Woollypod	SOC	—	N
Astragalus mohavensis var. *hemigyrus*	Halfring Milkvetch	SOC	CE	S
Astragalus remotus[a]	Spring Mountain Milkvetch	SOC	—	N
Eriogonum bifurcatum[a]	Pahrump Valley Buckwheat	SOC	—	N
Eriogonum heermannii var. *clokeyi*	Clokey Buckwheat	SOC	—	N
Glossopetalon pungens var. *glabra*[a]	Smooth Dwarf Greasebush	SOC	—	N
Glossopetalon pungens var. *pungens*[a]	Dwarf Greasebush	SOC	—	N
Ivesia jaegeri[a]	Jaeger Ivesia	SOC	—	N
Penstemon bicolor ssp. *bicolor*	Yellow Twotone Beardtongue	SOC	—	N
Penstemon bicolor ssp. *roseus*	Rosy Twotone Beardtongue	SOC	—	—
Penstemon fruticiformis ssp. *amargosae*	Death Valley Beardtongue	SOC	—	N
Selaginella utahensis	Utah Spikemoss	SOC	—	—

Source: Miskow 2001; Burroughs 2001.

a. Covered species under the Clark County MSHCP.

b. SOC = species of concern.

c. N = Nevada special status species.

d. CE = critically endangered.

e. S = BLM sensitive species.

Las Vegas Bearpoppy. The Las Vegas bearpoppy (*Arctomecon californica*) is a perennial that grows in areas such as barren, gravelly desert flats, hummocks, and slopes. Distribution is patchy, across low badland hills and sometimes on ridges and benches. The Las Vegas bearpoppy is listed as critically endangered by the state of Nevada and is listed by the BLM as a sensitive species. It is currently found only in the northern part of Clark County and a few northern Arizona sites. Major populations occur in Las Vegas Valley and are typically associated with the silty, gypsum-rich soils of the Colorado River drainage. Populations in this area are considered regionally significant because this is the only known area in the world where this plant grows. The cluster of silvery-green, fuzzy, bearpaw-shaped leaves remaining when the plant is dead or dormant leaves a visually noticeable mound; therefore, any remains would have been easily identified during field investigations. This species is unlikely to occur in the project area.

White Bearpoppy. White bear poppy (*Arctomecon merriamii*) is endemic to eastern California and portions of Nevada. It is an herbaceous perennial that stems from a taproot and reaches a height of 8 to 16 in. The species is listed by the BLM as a Nevada special status species and is found in loose rocky slopes associated with creosote bush and scrub at elevations of 2,000 to 4,500 ft above msl. This species has a potential to occur along the washes and rocky outcrops at the lower elevations of the project area.

Black Woollypod. Black woolypod (*Astragalus funereus*) is a federal SOC and a BLM Nevada special status species. This small perennial herb occurs on dry, open scree, talus, or gravelly alluvium derived from light-colored volcanic tuff. It has been recorded from elevations of 3,200 to 7,680 ft above msl. Its range encompasses southern Nevada and California. This species may potentially occur in the project area.

Halfring Milkvetch. Halfring milkvetch (*Astragalus mohavensis* var. *hemigyrus*) is an SOC, a BLM special status species, and is listed as critically endangered by the state of Nevada. This perennial occurs at elevations ranging from 4,065 to 6,070 ft above msl on limestone ledges and gravelly hillsides (Mozingo and Williams 1980). This species has the potential to occur within the project area at higher elevations.

Spring Mountains Milkvetch. Spring Mountains milkvetch (*Astragalus remotus*) is a locally abundant endemic perennial known only from Rocky Gap in Red Rock Canyon to Goodsprings along the southeastern slopes of the Spring Mountains. This SOC occurs in gravelly soils, rocky hillsides, and along desert washes. This plant is typically associated with pinyon-juniper, sagebrush, grassland, blackbrush, and Mojave Desert scrub communities. The major threats to this species include competition and encroachment from exotic species and disturbance from recreational activities and wild horses and burros. This species has the potential to occur within all reaches of the project area.

Pahrump Valley Buckwheat. Pahrump Valley buckwheat (*Eriogonum bifurcatum*) is a federal SOC and a BLM Nevada special status species. It occurs mostly in barren, saline, heavy clay or silty hardpan soils on or near playa margins. This species range includes Clark and Nye counties, Nevada, and eastern California. This species is unlikely to occur in the project area.

Clokey Buckwheat. Clokey buckwheat (*Eriogonum heermannii* var. *clokeyi*) is listed by the BLM as a Nevada special status species. The species is endemic to Nevada, occurring in Clark and Nye counties. Habitat for Clokey buckwheat includes carbonate outcrops, talus, scree, and gravelly washes and banks in the creosote-bursage, shadscale, and blackbrush zones. This species may potentially occur in the project area, but it was not observed during the botanical surveys.

Smooth Dwarf Greasebush. Smooth dwarf greasebush (*Glossopetalon pungens* var. *glabra*) is endemic to the Mojave Desert mountains and can be found in southern Nevada and the Clark Mountains in San Bernardino, California. It is an SOC and a BLM Nevada special status species that is typically associated with pinyon-juniper and sagebrush communities in limestone cliffs and rocky slopes between 4,000 and 6,500 ft above msl. Within Clark County, the species is found in the Sheep Range and Spring Mountains at elevations

of 6,000 to 7,000 ft above msl. The major threats to this species include adverse habitat modification and indirect effects due to dispersed recreational activities. This species has the potential to occur within the extreme northern portion of the project area.

Dwarf Greasebush. Dwarf greasebush (*Glossopetalon pungens* var. *pungens*) is a southern Nevada endemic found in the Spring Mountains and Sheep Range within Clark County. This species is an SOC and a BLM Nevada special status species that typically occurs within pinyon-juniper and sagebrush communities and on limestone cliffs and rocky slopes. The major threats to this species include adverse habitat modification and indirect effects due to dispersed recreational activities. This species has the potential to occur within the extreme northern portion of the project area.

Jaeger Ivesia. Jaeger ivesia (*Ivesia jaegeri*) is an SOC and BLM Nevada special status species that is endemic to the Spring Mountains, Nevada, and the Clark Mountains in San Bernardino, California. Within Clark County, the population includes about 10,000 individuals occurring at 35 sites on approximately 80 ac in Lee, Deer, Kyle, and Carpenter Canyons in the Spring Mountains and in the La Madre Mountains to Mt. Potosi. Jaeger ivesia is associated with Bristlecone pine (*Pinus longaeva*), mixed conifer communities, and can be found in bedrock and crevices of vertical and near-vertical cliff faces of limestone and dolomite outcrops at elevations from 5,200 to 11,200 ft above msl. The major threats to this species include adverse habitat modification and indirect effects due to dispersed recreational activities. This species has a slight potential to occur within the extreme northern portion of the project area.

Yellow Twotone Beardtongue. Yellow twotone beardtongue (*Penstemon bicolor bicolor*) is a perennial that grows in shallow gravelly washes and on roadsides at elevations ranging from 1,970 to 5,480 ft above msl. It is typically associated with creosote bush habitats, and its known distribution is Clark County, Nevada, and portions of Arizona. The species is an SOC and a BLM special status species. It was found during the botanical surveys within the washes of the proposed laydown area in Section 16 of Township 24, South Range 58 East.

Rosy Twotone Beardtongue. Rosy twotone beardtongue (*Penstemon bicolor roseus*) grows in shallow gravelly washes and on roadsides at elevations ranging from 1,970 to 5,480 ft above msl. It is typically associated with creosote bush habitats, and its known distribution is Clark County, Nevada, and portions of Arizona. This perennial is a federally listed SOC and occurs within the proposed laydown area in Section 16 of Township 24 South, Range 58 East.

Death Valley Beardtongue. Death Valley beardtongue (*Penstemon fruticiformis amargosae*) is a federal SOC and a BLM Nevada special status species. Range maps show localities from Nye County, Nevada, and California, but no locations from Clark County, Nevada. Habitat for the species is poorly understood. Based on the known geographic range of the species, it is unlikely to occur in the project area.

Utah Spikemoss. Utah spikemoss (*Selaginella utahensis*) is a perennial, moss-like plant that forms dense, flat mats of intertwined branches. It is a federal SOC that occurs on sandstone ledges near water in deep canyons. Its range includes southern Nevada and Utah. In Nevada, it is known only in Red Rock Canyon in Clark County. This species is unlikely to occur in the study area.

3.5.2 Terrestrial Wildlife

All wildlife species observed within the project area or identified by indirect evidence (such as tracks, burrows, carcasses, or scat) are listed in Appendix D. These species are adapted to desert scrub and pinyon pine. Due to the scarcity of permanent water resources, no aquatic species are expected to occur in the project area and none were observed during field investigations. Wildlife observations were noted while conducting the spring botanical surveys and protocol surveys for the desert tortoise.

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Reptilian fauna common to the project area include the western whiptail (*Cnemidophorous tigris*), zebratail lizard (*Callisaurus draconoides*), desert iguana (*Dipsosaurus dorsalis*), side-blotched lizard (*Uta stansburiana*), longnose leopard lizard (*Gambelia wislizenii*), Mojave black-collared lizard (*Crotaphytus bicinctores*), desert spiny lizard (*Sceloporus magister*), sagebrush lizard (*Sceloporus graciosus graciosus*), banded Gila monster (*Heloderma suspectum cinctum*), chuckwalla (Sauromalus obsesus), western patch-nosed snake (*Salvadora hexalepis mojavensis*), red coachwhip (*Masticophis flagellum piceus*), gopher snake (*Pituophis catenifer*), speckled rattlesnake (*Crotalus mitchelli*), and desert tortoise (*Gopherus agassizii*).

Avifauna observations were made during all aspects of the field investigations. A list of birds observed in the project area and vicinity are presented in Appendix D. Species commonly observed in the project area include the violet-green swallow (*Tachycineta thalassina*), Brewer's sparrow (*Spizella breweri*), black-throated sparrow (*Amphispiza belli*), black-tailed gnatcatcher (*Poiloptila nigriceps*), northern mockingbird (*Mimus polyglottos*), Bewick's wren (*Thryomanes bewickii*), white-throated swift (*Aeronautes saxatallis*), common raven (*Corvus corax*), and red-tailed hawk (*Buteo jamaciensis*).

Common mammalian species observed in the project area included desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), antelope ground squirrel (*Ammospermophilus leucurus*), kangaroo rat (*Dipodomys* spp.), desert woodrat (*Neotoma lepida*), kit fox (*Vulpes velox*), bobcat (*Lynx rufus*), and coyote (*Canis latrans*).

3.5.2.1 Game Animals

Desert Bighorn Sheep. Desert bighorn sheep are typically divided into four subspecies: *Ovis canadensis weemsi*, *O. c. cremnobates*, *O. c. mexicana*, and *O. c. nelsoni*. The Table Mountain project area is part of the core use area and is an important lambing area for *O. c. nelsoni* in the south Spring Mountain Range (Cummings 2001). Bighorn sheep are known to inhabit rugged terrain with elevations between 5,000 and 7,000 ft above msl, venturing to lower elevations for food and water when necessary. Habitat within the project area is rough, rocky, and bisected by washes and canyons. Generally, desert bighorn sheep require steep rugged areas for lambing and escape terrain (Ferrier and Bradley 1970; Douglas and Kingsley 1981).

Bighorn sheep are a gregarious species, which experience "seasonal drift" or a gradual seasonal movement of some, but not all, members of each band between seasonal ranges (Monson and Sumner 1981). They typically use larger upland habitats in the summer and concentrate in sheltered valleys during the winter.

While lack of water is the single most limiting factor for bighorn herds in the desert (Monson and Sumner 1981), certain basic resources are required for bighorn for survival. These are food, water, escape terrain, and space, or a lack of crowding (Monson and Sumner 1981). Bighorn sheep have a preference for grasses and shrubs over forbs (Ginnett 1982). Surface water utilization by bighorn sheep is dependent on several factors including complementary water available through food and environmental heat load. The distribution of water in most of the bighorn range limits their population size (Welles and Welles 1961).

Without proper terrain to support escape, desert bighorns would be absent. Their cloven front hooves and the heavy musculature of their front shoulders make bighorn sheep more suited for climbing steep surfaces than for running at high speeds on open terrain to escape danger (McQuivey 1978). This characteristic affects not only the specie's choice of forage and water sources, but their ability to reproduce. Rutting season is generally in the autumn and early winter, with births occurring in late winter and early spring. On the Desert Wildlife Range (Nevada), lambs are usually born in the roughest terrain (Monson and Sumner 1981). Such terrain generally has caves or overhanging rocks that offer lambs protection from predators and weather, although ewes do not always seek out rough areas and may have their lambs on open desert slopes (Simmons 1969). Traditional lambing areas, such as the Table Mountain project area, are chosen on the basis of isolation, shelter, and an unobstructed view.

The desert bighorn sheep are known to inhabit the project area and were directly observed on Shenandoah Peak. Desert bighorn sheep sign, including pellets, urine spots, tracks, and beds, were observed throughout the steeper portions of the project area with the highest concentrations occurring in the vicinity of Deadmans Canyon and south to the project terminus.

Mule Deer. Mule deer (*Odocoileus hemionus*) potentially occur in the project area. Suitable habitat within the project area is located in the area north of Wilson Pass in the pinyon-juniper vegetation community. No mule deer were observed during the field survey, but they likely occur in low numbers north of Wilson Pass.

Gambel's Quail. Gambel's quail (*Callipepla gambelii*) is a common resident in southern Nevada and inhabits desert scrub and thickets, usually near a permanent water source. This species likely occurs throughout the project area. It was observed along the existing VEA 230-kV transmission line corridor at the eastern base of Table Mountain.

Chukar. The chukar (*Alectoris chukar*) is an introduced game-bird species that inhabits rocky, arid mountainous areas of the west. Like the Gambel's quail, highest numbers would usually be in proximity to permanent water. Chukar were observed at Table Mountain and along the access road to Shenandoah Peak, but are likely found in low numbers throughout most of the project area.

Mourning Dove. The mourning dove (*Zenaida macroura*) is a common, statewide summer resident. It was observed throughout the project area, but never in large numbers. This species likely nests within the project area in the taller overstory vegetation.

Furbearers. Nevada furbearers occurring within the project area include the coyote and bobcat. Both species likely occur throughout the project area and vicinity. Sign of both species were observed on Table Mountain.

Wild Horse and Burro. Wild horse and burro have been known to occur within portions of the proposed project area. Sign of both species was observed in the Wilson Pass area.

On December 15, 1971, Congress passed the Wild Free Roaming Horses and Burros Act (Public Law 92-195) to protect, manage, and control wild horses (*Equus caballus*) and burros (*E. asinus*) on public lands. The BLM and the USFS are charged with administering this law, which specifies how wild horses, burros, and excess animals are to be managed on the range. Section 3(a) of the act requires the Secretary of the Interior to manage free-roaming horses and burros in a manner designed to achieve and maintain a thriving natural ecological balance on public lands. The law also specifies requirements for inventorying, monitoring, establishing appropriate management levels, making removals, placing excess animals, and establishing criteria for destruction of animals.

The wild horse and burro found in the American southwest today were introduced by the Spanish in the early fifteenth century, becoming feral as early as the 1600s (Woodward 1976; Walker and Ohmart 1978). The exact numbers of wild horses and burros introduced in this manner is unknown, but they soon became feral and today appear to be well-established in the region (Breyen 1971). With few predators and with protection from humans, wild horse and burro populations on public lands quickly grew until control of the populations and the effect on their habitat became a major concern.

In response, BLM and USFS developed a strategy that established herd areas and formed herd management areas (HMA), of which there are currently 103 throughout Nevada. The Las Vegas District has nine HMAs. The northern one-third of the Proposed Action area is within the Red Rock HMA, which occurs north of the Sandy Valley Road (see Figure 2-1, p. 2-2 for Red Rocks HMA boundary). The Red Rock HMA currently has approximately 75 horses and 75 burros. Use of the southern portion of the HMA by wild horse and burro has

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been limited to spring, fall, and winter when physiological water requirements are lower. The burro population extends farther south of the HMA boundary to Sandy Valley Road.

3.5.2.2 Threatened, Endangered, and Sensitive Wildlife Species

This section addresses federal- and state-listed endangered and threatened species and BLM-listed sensitive species that are of potential occurrence in the project area. Sensitive wildlife species include SOCs and those recognized by the state of Nevada under NRS 501 as threatened with extinction, on the state watch list, or protected and regulated. The BLM may also classify certain biota as "Nevada special status species." All birds (except house sparrows, starlings, and pigeons) are protected by international treaty under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711), as amended. Game and furbearing species are also protected by the NDOW. A list of these species and their current status is found in Table 3-3 (p. 3-31). A brief description of each species and its habitat follows.

Desert Tortoise. On April 2, 1990, the USFWS listed the Mojave desert tortoise (*Gopherus agassizii*) population as threatened as a result of significant population decline and habitat loss, thereby bringing it under full protection of the ESA, as amended. In Nevada, the desert tortoise has been categorized as "protected" pursuant to NRS 501.110 and Nevada Administrative Code (NAC) 503.080 and 503.090.

Critical habitat for the desert tortoise was designated on March 10, 1994 (59 Federal Register 5820). Portions of land in the vicinity of, but not including, the project area have been established as critical habitat.

The desert tortoise occurs on arid lands, typically in association with low, desert creosote bush scrub communities. These communities are dominant below elevations of 5,000 ft above msl and are characterized by perennial shrubs, creosote bush, bursage, Joshua trees, cacti, grass, and a large variety of other perennial and annual plants. Preferred desert tortoise habitat includes scattered shrubs and a sufficient herbaceous understory layer to provide food and water needs. The desert tortoise occurs most often on flats and bajadas characterized by sandy to sandy-gravelly soils, but may also occur on slopes and in rocky soils.

Field surveys for the desert tortoise were conducted from May 7–10, 2001. Areas surveyed include WTG corridors, access roads, laydown areas, the substation location, and the proposed 34.5-kV distribution line, part of which would parallel the VEA 230-kV transmission line. On November 14, 16, and 18, 2001, field surveys were performed along the access road to Shenandoah Peak and at the new substation location. The locations of survey transects and triangle transects are shown in Appendix E.

A total of 34 tortoise sign (burrows, tracks, live tortoises, scat or droppings, skeletal parts, and carcasses) were observed over the area surveyed. A total of approximately 300 ac were surveyed. Consideration of only total sign would result in overestimation of tortoise population densities; therefore, total sign was adjusted to account for sign clearly attributable to the same tortoise. Corrected sign was 33. Survey results demonstrate that desert tortoise population densities range from very low to low in the project area.

Banded Gila Monster. The banded Gila monster (*Heloderma suspectum cinctum*), a federal SOC and a BLM-listed sensitive species, is most commonly found on the lower slopes of rocky canyons and arroyos, but is also associated with desert flats supporting scrubs and succulents. In general, the banded Gila monster seems to prefer slightly moist habitats such as those found in canyons, arroyos, and desert washes. The banded Gila monster is distributed from southwestern Utah and southern Nevada south to southern Sonora, Mexico, and from the Colorado River east to extreme southwestern New Mexico. The banded Gila monster is a known inhabitant of the project area (Miskow 2001) although it was not observed during the field surveys.

Chuckwalla. The chuckwalla (*Sauromalus obesus*), a federal SOC, is found throughout the deserts of the southwestern United States and northern Mexico. Chuckwallas inhabit rock outcrops where cover is available between boulders or in rock crevices typically on slopes and open flats below 6,100 ft above msl. Typical

Table 3-3. Federal, State, and BLM Sensitive Wildlife Species with the Potential to Occur in the Table Mountain Project Area.

Species		Status		
Scientific Name	**Common Name**	**USFWS**	**NV**	**BLM**
Reptiles				
Gopherus agassizii[a]	Desert tortoise	T[b]	—	—
Heloderma suspectum cinctum	Banded Gila monster	SOC[c]	P[d]	S[e]
Sauromalus ater	Chuckwalla	SOC	—	N[f]
Birds				
Athene cunicularia hypugea	Western burrowing owl	SOC	P	—
Contopus borealis	Olive-sided flycatcher	SOC	P	—
Empidonax wrightii	Gray flycatcher	SOC	P	—
Falco peregrinus anatum	American peregrine falcon	DL[g]	P	—
Phainopepla nitens[a]	Phainopepla	SOC	P	S
Mammals				
Corynorhinus townsendii pallescens	Townsend's big-eared bat	PS[h]		N
Euderma maculatum	Spotted bat	SOC	T	N
Eumops perotis californicus	Greater western mastiff bat	SOC	—	N
Idionycteris phyllotis	Allen's big-eared bat	SOC	—	N
Macrotus californicus	California leaf-nosed bat	SOC	—	N
Myotis ciliolabrum	Small-footed myotis	SOC	—	N
Myotis evotis[a]	Long-eared myotis	SOC	—	—
Myotis thysanodes	Fringed myotis	SOC	—	N
Myotis volans[a]	Long-legged myotis	SOC	—	—
Myotis yumanensis	Yuma myotis	SOC	—	—
Nyctinomops macrotis	Big free-tailed bat	SOC	—	N
Invertebrates				
Chlosyne acastus robusta[a]	Spring Mountains acastus checkerspot	SOC	—	—
Euphilotes enoptes pupurea[a]	Dark blue butterfly	SOC	—	—
Euphydryas anicia morandi[a]	Morand's checkerspot butterfly	SOC	—	—
Hesperia comma mojavensis[a]	Spring Mountains comma skipper	SOC	P	S
Limenitus weidemeyerii nevadae	Nevada admiral butterfly	SOC	—	—
Icaricia icarioides austinorum[a]	Spring Mountains icarioides blue	SOC	—	—
Icaricia shasta charlestonensis[a]	Mt. Charleston blue butterfly	SOC	—	—
Speyeria zerene carolae[a]	Carole's silverspot butterfly	SOC	—	—
Lasius nevadensis	Charleston ant	SOC	—	—
Pyrgulopsis deaconi[a]	Spring Mountains springsnail	SOC	—	—

Source: Miskow 2001; Burroughs 2001.

a. Covered species under the Clark County MSHCP.
b. T = threatened.
c. SOC = species of concern.
d. P = species protected under NRS 501.
e. S = BLM sensitive species.
f. N = Nevada special status species.
g. DL = Delisted.
h. P = partial status.

habitat includes rocky hillsides and talus slopes, boulder piles, lava beds, or other clusters of rock, usually in association with desert scrub habitat including Mojave desert scrub, blackbrush, salt desert scrub, and mesquite/catclaw. It requires shady, well-drained soils for nests. The chuckwalla is a widespread species, but is regionally limited by its requirement for rock outcrops. Chuckwalla are known to occur throughout the project area. Several individuals of the species and their sign were observed during field surveys in April and May 2001.

Western Burrowing Owl. The western burrowing owl (*Athene cunicularia hypugea*) is a federal SOC and protected under the MBTA. This species is found in a variety of open habitats throughout its range, including the desert floor. This species is a year-round resident in open, dry, grassland, Mojave Desert scrub, sagebrush/perennial grassland, and open shrub stages of pinyon-juniper and mixed conifer habitats. It is distributed throughout Clark County in the Mojave Desert and lower elevations of the Great Basin units in appropriate habitat. A strong association exists between burrowing mammals and this owl. The presence of a nest burrow seems to be a critical requirement, and they often use tortoise burrows. Burrowing owls have the potential to occur within the proposed project area, although none were observed during the field surveys.

Olive-Sided Flycatcher. The olive-sided flycatcher (*Contopus borealis*) is considered a federal SOC. It is an uncommon summer visitor in Clark County (Titus and Weeks 1991). Habitat for this species in southern Nevada consists of montane forests and riparian areas. This species was not observed during the field surveys, but may potentially occur in the northern portion of the project area.

Gray Flycatcher. The gray flycatcher is also a SOC and is considered a common spring and fall migrant in Clark County (Titus and Weeks 1991). In southern Nevada, it can be found in riparian areas, foothills ranging in elevation from 4,000 to 7,000 ft, and montane forests (Titus and Weeks 1991). This species was not observed in the project area, although it could pass through the area during migration.

American Peregrine Falcon. The American peregrine falcon (*Falco peregrinus anatum*) was recently removed from the federal list of endangered and threatened species, but is protected under the MBTA. American peregrine falcons occur in a wide range of open country habitats from desert mountains to seacoasts. The presence of tall cliffs is the most characteristic feature of the peregrine's habitat and is considered to be a limiting factor for this species. Cliffs provide the peregrine falcon with both nesting and perching sites and an unobstructed view of the surrounding area. Where cliffs are lacking, manmade structures such as buildings and bridges are occasionally used as substitutes. A nearby source of water that supports an adequate prey base of small- to medium-sized birds is another common feature of peregrine falcon habitat that influences their distribution and abundance. In southern Nevada, the peregrine falcon breeds within the Lake Mead National Recreation Area and at sites near Lake Mohave.

Breeding habitat for the American peregrine falcon does not exist in the study area, but the species has the potential to pass through the area during migration.

Phainopepla. The phainopepla (*Phainopepla nitens*) breeds from central California, southern Nevada, southern Utah, southern New Mexico, and western Texas south to Baja California and into Mexico. It is also known to winter from southern California, southern Nevada, central Arizona, southern New Mexico, and western and southern Texas. The phainopepla is known to be a resident in southern Nevada. In deserts, it primarily inhabits washes, riparian areas, and other habitats that support a brushy growth of mesquite, catclaw, ironwood, and palo verde. In more northern and coastal areas, it inhabits oak chaparral and riparian oak woodlands. Special habitat requirements include trees or shrubs and berries (especially mistletoe). This federal SOC and BLM-listed sensitive species builds nests (almost exclusively by the male) in the forked limbs of a mesquite (*Prosopis* spp.), cottonwood (*Populus* spp.), hackberry (*Celtis* spp.), willow (*Salix* sp.), sycamore (*Plananus* sp.), oak, or citrus tree (*Quarcus* sp.), often in clumps of mistletoe 4 to 5 ft above the ground. The species is known to occur in the project area.

Desert Kit Fox. The desert kit fox is known to inhabit much of the desert southwest. It is a year-round resident throughout southern Nevada. Its primary habitat is blackbrush, saltbush, and creosote bush scrub. They are also found in sagebrush, mesquite, lowland riparian, barren, pinyon-juniper, and grassland habitats. While the desert kit fox is not federally or state listed as threatened or endangered, it is considered sensitive by the BLM and a furbearing species by NDOW. Kit fox occur within the project area and their burrows were observed during the field surveys.

Townsend's Big-Eared Bat. Townsend's big-eared bat (*Corynorhinus townsendii pallescens*) is a federal SOC and is considered a Nevada special status species by the BLM. The Townsend's big-eared bat occurs throughout the west and is distributed from the southern portion of British Columbia south along the Pacific Coast to central Mexico and east into the Great Plains, with isolated populations occurring in the south and southeastern United States (Sherwin 1998).

In Nevada, the species is typically found in low desert to midelevation montane habitats, although sightings have been reported up to 10,800 ft (Philpott 1997; Sherwin 1998). Habitat associations include desert, native prairies, coniferous forests, midelevation mixed conifer, mixed hardwood-conifer forests, riparian communities, active agricultural areas, and coastal habitat types (Kunz and Martin 1990; Brown 1996; Sherwin 1998). Distribution of this species is strongly correlated with the availability of caves and cavelike roosting habitat (Sherwin 1998). Populations have incurred serious declines over the past 40 years in parts of the southwest (Brown 1996). Townsend's big-eared bat is a year-round Nevada resident and may inhabit the project area.

Spotted Bat. The spotted bat (*Euderma maculatum*) is a federal SOC and has a scattered distribution throughout Nevada that is linked to the availability of cliff roosting habitat. This mammal is also listed as a Nevada special status species. They are found in a wide variety of habitats from low-elevation desert scrub to high-elevation coniferous forest habitats and are closely associated with rocky cliffs. The spotted bat day-roosts primarily in crevices on cliff faces, but there is some indication that mines and caves may occasionally be used, primarily in winter. The species hibernates, but periodically arouses and actively forages and drinks throughout the winter. Its diet includes a variety of insects but predominantly consists of moths. In desert settings, foraging occurs in canyons, in the open, or over riparian vegetation. In montane habitats, individuals forage over meadows, along forest edges, or in open coniferous woodland. The major threats to this species include recreational climbing and mining and quarry operations. This species may occur in the project area.

Greater Western Mastiff Bat. The greater western mastiff bat (*Eumops perotis californicus*) is a federal SOC and is considered by the BLM as a Nevada special status species. This bat generally seeks refuge in crevices in rocks that form vertical or nearly vertical cliffs. Roost sites are usually chosen where there is a an unobstructed drop of several feet, so emerging bats can drop and gain sufficient momentum to become airborne (Davis 1978). The species feeds on a variety of insects, but the majority of its diet consists of moths. This species may inhabit the project area.

Allen's Big-Eared Bat. Allen's big-eared bat (*Idionycteris phyllotis*) is a federal SOC and a BLM Nevada special status species. This animal is found in southern Nevada, and can be found in various localities in the Spring Mountain Range and near Gold Butte. In the summer, the species generally occupies high-elevation pine and oak woodland, but also uses a variety of riparian woodland across a wide range of elevation gradients. In the winter, it is generally found at lower elevations from creosote bush to pinyon-juniper habitats. The species is generally a year-round resident, but shifts elevations from summer to winter. The species hibernates, but may periodically forage and drink throughout the winter. It day-roosts in trees (large dead snags), but there is some indication that mines and caves are used. The species feeds on a variety of insects, predominantly moths. The major threats to this species include mine and quarry operations. This species has the potential to occur within the project area.

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California Leaf-Nosed Bat. California leaf-nosed bat (*Macrotus californicus*) historically roosted in the Las Vegas Valley and along the Colorado River, but roosts have been destroyed by abandoned mine closures and inundation by the formation of Lakes Mead and Mojave. This species is listed as a federal SOC and a BLM Nevada special status species. Only a few roosts are known to exist, although there may be some foraging activity along the Virgin River (based on Arizona reports) from the confluence of Virgin River and Beaver Dam Wash. The species inhabits low-elevation desert scrub habitats, and roosts are located below 3,000 ft above msl in proximity to desert riparian areas. The species is a year-round resident and does not hibernate. The species is dependent on mines and caves for diurnal roosting. Night roosting occurs in a variety of places, including buildings, cellars, porches, bridges, rock shelters, and mines. Summer colonies may range from six to several hundred individuals, with winter colonies containing one-hundred to over one-thousand individuals. Although it is believed that this species does not migrate, local movements among roosts occur, particularly on a seasonal basis. Food items include grasshoppers, cicadas, moths, butterflies, dragonflies, beetles, and caterpillars. Foraging occurs close to vegetation or the ground, and prey items are gleaned from these surfaces. The species does not require drinking water, but gets moisture from prey items. The major threats to this species include recreational caving, mining, and habitat destruction to riparian vegetation. The species is behaviorally sensitive to roost disturbance. This species is not likely to occur in the project area.

Small-Footed Myotis. The small-footed myotis (*Myotis ciliolabrum*) is a federal SOC and is also a BLM Nevada special status species. The small-footed myotis is a year-round resident found throughout the Nevada. In southern Nevada, it is primarily found at middle and higher elevations (>6,000 ft above msl), although it is occasionally found at lower elevations. In the central and northern part of the state, it is more common at valley bottoms (3,500 ft). The species inhabits a variety of habitats including desert scrub, grasslands, sagebrush steppe, pinyon-juniper woodlands, and pine forests. The species hibernates, and roosts have been found in caves, mines, and trees. The species forages in the open for small moths, flies, ants, and beetles. The small-footed myotis has been recorded from Wilson Tank to northeast of the project area (Heindl 2001) and is likely to occur in the project area.

Long-Eared Myotis. Long-eared myotis (*Myotis evotis*) is a federal SOC and a year-round resident found throughout the state, primarily at the higher elevations associated with coniferous forests. The species is more widespread and common in the northern half of the state. In southern Nevada, it is only found in ponderosa pine (*Pinus ponderosa*) or above. In northern Nevada, it is common in pinyon-juniper and above. The species is presumed to be nonmigratory and to hibernate locally. It day roosts in hollow trees, under exfoliating bark, crevices in small rock outcrops, and occasionally in mines, caves, and buildings. Night roosts have been found in caves, mines, and under bridges. The species forages along rivers and streams, over ponds, and within cluttered forest environment for moths, small beetles, and flies. It appears to have a flexible foraging strategy, catching insects by both substrate and aerial pursuit. This species is not expected in the project area.

Fringed Myotis. Fringed myotis (*Myotis thysanodes*) is a year-round resident found through central and southern Nevada and probably in northern Nevada as well. The species is a federal SOC and a BLM Nevada special status species. It is found in a wide range of habitats from low-desert scrub habitats to high-elevation coniferous forests. The species hibernates but is capable of periodic winter activity. Day and night roosting occurs in mines, caves, trees, and buildings. The majority of roosts documented in California have been in buildings or mines. The species has been radio-tracked to tree hollows, particularly large conifer snags in Oregon and Arizona, and rock crevices in cliff faces in southern California. Hibernacula are generally mines or caves. The species forages among vegetation primarily for beetles, but also a variety of other taxa including moths. The species is very sensitive to roost disturbance. The major threats to this species include recreational caving, mining, building demolition, pest control, and timber harvest. The fringed myotis is a species that potentially may occur in the project area.

Long-Legged Myotis. Long-legged myotis (*myotis* volans) is federal SOC and a year-round resident found throughout Nevada, but is more widespread and common in the northern half of Nevada. The species occurs

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Small-Footed Myotis. [illegible]

Long-Eared Myotis. [illegible]

Fringed Myotis. [illegible]

Long-Legged Myotis. [illegible]

from mid- to high elevations, and is absent from the low desert. It is associated with pinyon-juniper, Joshua tree woodland, and montane coniferous forest habitats. It is suspected that there are elevational and latitudinal movements between summer and winter roosts. The species hibernates, but has the capability of winter activity. Day roosting primarily occurs in hollow trees, particularly large diameter snags or live trees with lightning scars. The species also uses rock crevices, caves, mines, and buildings when available. Caves and mines may be used for night roosts. The species forages in open areas, often at canopy height, and feeds primarily on moths, but also feeds on other taxa, including beetles, flies, and termites. Population declines have been observed in the Spring Mountains of southern Nevada. The major threats to this species include timber harvest, aerial pesticide spraying, recreational caving, mining, building demolition and pest control. This species may potentially occur in the project area.

Yuma Myotis. The Yuma myotis (*Myotis yumanensis*) is a federal SOC that inhabits the open regions of the southwestern United States. Its daytime retreats include caves, tunnels, abandoned mines, and abandoned buildings. It is one of the more common species of western *Myotis* and is a likely inhabitant of the project area

Big Free-Tailed Bat. The big free-tailed bat (*Nyctinomops macrotis*) is a federal SOC and a BLM-listed Nevada special status species. The range of this species includes the arid southwest, and northward into the Pacific Northwest (Burt and Grossenheider 1976). Roosting habitat includes crevices in cliffs, caves, and abandoned buildings. The diet consists primarily of large moths, but also can include grasshoppers, flying ants, stinkbugs, beetles, and leafhoppers (Davis 1978). Habitat for this species occurs in the project area and its presence within the project area is likely.

Spring Mountains Acastus Checkerspot Butterfly. The Spring Mountains acastus checkerspot (*Chlosyne acastus robusta*) is a federal SOC and a BLM-listed Nevada sensitive-status species. It is endemic to the Spring Mountain range, feeds on the nectar of the species *Viguiera multiflora*, and inhabits primarily mixed conifer and pinyon-juniper. It can also be found in sagebrush. Habitat for this species occurs within the northern extent of the project area at higher elevations north of Wilson Pass, but its presence is unlikely.

Dark Blue Butterfly. The dark blue butterfly (*Euphilotes enoptes pupurea*) is a federal SOC and a BLM-listed Nevada sensitive-status species. It is endemic to the Spring Mountains and is typically found at midelevations (5,900 to 8,200 ft above msl). The dark blue butterfly inhabits pinyon-juniper and mixed conifer forest habitat and feeds on the nectar of *Eriogonum umbellatum*. Habitat for this species is known to occur within the northern extent of the project area at higher elevations north of Wilson Pass, but its presence is unlikely.

Morand's Checkerspot Butterfly. The Morand's checkerspot butterfly (*Euphydryas anicia morandi*) is a federal SOC that occurs at elevations of 6,800 to 11,280 ft above msl within the Spring Mountains. This endemic prefers meadows within bristlecone pine habitat, but can also occur in mixed conifer and pinyon-juniper. Known nectar species include *Taraxacum offininale* and *Erysimum asperum*. This species is unlikely to occur within the project area.

Spring Mountains Comma Skipper. The Spring Mountains comma skipper (*Hesperia comma mojavensis*) is a federal SOC and a BLM-listed Nevada sensitive-status species that is endemic to the Spring Mountains. It occurs in bristlecone pine and woodland and forest belts at elevations of 5,000 to 11,300 ft above msl. This species feeds on the nectar from *Cirisium* sp., *Taraxacum offinale*, and *Penstemon palmeri*. Habitat for this species occurs within the project area and its presence is likely.

Nevada Admiral Butterfly. The Nevada admiral butterfly (*Limenitus weidemeyerii nevadae*) is a federal SOC and BLM-listed Nevada sensitive-status species. It is endemic to the Spring and Sheep Mountains. Known from 46 sites between 3,000 and 9,200 ft above msl, this species occurs primarily in bristlecone pine and in wet areas near high-elevation springs. Preferred nectar species include *Eridictyon angustifolium*, *Clematis*

liquiticifolia, and *Marrubium vulgare*. Habitat for this species is known to occur within the northern extent of the project area at higher elevations north of Wilson Pass, but its presence is unlikely.

Spring Mountains Icarioides Blue. The Spring Mountains icarioides blue (*Icaricia icarioides austinorum*) is a federal SOC and a BLM-listed Nevada sensitive-status species. It is endemic to the Spring Mountains at elevations of 5,900 to over 9,800 ft above msl. The icarioides blue feeds on the nectar of *Eriogonum embellatum, Chaenactic douglasii, and Linum lewisii* and prefers disturbed areas, such as road cuts and campsites, but also occurs in the bristlecone pine and mixed conifer. It also uses pinyon-juniper and sagebrush, which occur within the northern extent of the project area, but the species is unlikely to occur in this area.

Mount Charleston Blue Butterfly. The Mount Charleston blue butterfly (*Icaricia shasta charlestonensis*) is a federal SOC with only seventeen documented occurrences. This endemic butterfly inhabits primarily bristlecone pine habitat, but has been known to occur in mixed conifer between 6,000 and 8,000 ft above msl. Known nectar plants include *Hymenoxys lemmonii, Aster* sp. and *Eriogonum* sp. This species is unlikely to occur within the project area.

Carole's Silverspot Butterfly. Carole's silverspot butterfly (*Speyeria zerene carolae*) is a federal SOC and a BLM-listed Nevada sensitive-status species. This endemic is widely distributed around the central portion of the Spring Mountains at elevations of 5,000 to 10,500 ft above msl. It prefers bristlecone pine habitat, but is known to occur in mixed conifer, pinyon-juniper, and sagebrush. Known nectar species include *Cirisium arizonicum, Erysimim asperus,* and *Angelica scarbrida*. Habitat for this species occurs within the northern extent of the project area at higher elevations north of Wilson Pass, but its presence is unlikely.

3.6 Cultural Resources

Cultural resource investigations were conducted from July 11, 2001, to November 26, 2001. The investigations included a complete inventory of the proposed WTG locations, meteorological towers, service and access roads, laydown areas, and substation location. The VEA transmission line corridor was previously surveyed for cultural resources in 1994 and was not surveyed as part of this project. No significant archaeological sites are located within the transmission line ROW corridor. Corridors, a minimum of 200 ft wide, were surveyed for the WTG locations and service and access roads by teams of one to two archaeologists walking in transects spaced at no more than 100 ft apart. The goal of this effort was to identify all potentially significant cultural resources within the area of potential effect (APE) and to assess potential impacts on them resulting from the Proposed Action or alternatives. The investigations were conducted in compliance with NEPA, the National Historic Preservation Act (NHPA) of 1966, as amended, the Archaeological Resources Protection Act (ARPA), and their respective implementing regulations and guidelines. The NHPA governs the preservation of historic properties throughout the nation. The ARPA governs excavations of archaeological resources on federal and Native American lands. The Proposed Action and alternatives is a federal undertaking with the BLM as lead agency for NHPA compliance.

Cultural resources are prehistoric and historic archaeological sites, districts, structures, or locations considered significant to a culture, a subculture, or a community for scientific, traditional, religious, or other reasons. Typical prehistoric archaeological resources include campsites, tool procurement sites, food-processing areas, and rock-art locations; typical historic sites may include structures, with features such as mine shafts or adits, transportation routes, and refuse deposits. A traditional cultural property (TCP) is a location that is valued by some group, such as an ethnic group, because it is a place of cultural patrimony and an important place in the traditional cultural landscape. Identified by Native Americans, TCPs often include places that figure prominently in Native American religion or oral tradition, such as sacred mountains or springs where important events took place in the legendary past.

3.6.1 Cultural Overview

The archaeological record of southern Nevada documents human use of this region beginning about 12,000 years ago. The cultural history of Southern Nevada can be discussed with reference to four major periods: Paleo-Archaic (10,000–5500 B.C.), Archaic (5500 B.C.–A.D. 300), Ceramic (A.D. 300–1500), and Historic (A.D. 1540–1950). The first three periods deal with Native American history and the fourth period with both Native American and Euro-American history.

Great Basin archaeologists generally distinguish two artifact traditions within the Paleo-Archaic period: the Fluted Point (Paleo-Indian) and the Stemmed Point (Lake Mojave) traditions. The Fluted Point tradition's most characteristic artifact is the large, distinctive Clovis point. These points may have had a variety of uses, but in southern Arizona, at least, some were hafted to thrusting spears. These hunting weapons were used to kill mammoths and other large mammals, or megafauna, that later became extinct. Fluted points have been recorded throughout the Great Basin, primarily as isolates. None have been found there in association with extinct megafauna. The Great Basin Stemmed Point tradition was first recognized in the 1930s, at sites located on the shores of Pleistocene Lake Mojave, California (Warren and Crabtree 1986). The sites possessed Lake Mojave and Silver Lake projectile points, as well as other distinctive artifacts called crescents (Warren and Crabtree 1986). Based on 60 years of research at these sites and others throughout the Great Basin, the Lake Mojave culture can be dated between 11,200 and 7,500 years ago, or roughly to 9200–5500 B.C. The Fluted Point and Stemmed Point traditions do not appear to be well-represented in Southern Nevada, though stemmed points have been recovered from a couple of sites including one near Jean Lake, southeast of Goodsprings (Warren 2001).

The Archaic tradition is characterized by a broad-spectrum adaptation to the animal and plant resources of a Holocene environment, that is, one that is more or less like the historic and modern-day environment. Characteristic artifacts of the Middle (5500–3000 B.C.) and Late Archaic (3000 B.C.–A.D. 300) periods include large projectile points that would have been hafted to darts that were propelled with atlatls. Grinding tools appear to be an important part of tool assemblages dating to the Middle Archaic, and they are common in Late Archaic assemblages. The Middle Archaic has also been called the Pinto period, in reference to the Pinto point, and the Late Archaic has been called the Gypsum period, in reference to the Gypsum point (Warren and Crabtree 1986).

The introduction of the bow and arrow and the adoption of pottery for cooking and storage marks the beginning of the Ceramic period (A.D. 300–1800). The replacement of lightweight basketry with heavier ceramic containers is usually associated with a farming economy and greater sedentism. Because pottery types vary from region to region, and because they correlate with other traits such as architecture and settlement patterns, pottery often forms the basis for defining prehistoric cultures. The Las Vegas Valley straddles the boundary between the Virgin Branch and Patayan culture areas. The ceramic assemblages from various sites in Las Vegas Valley frequently contain equal numbers of Patayan and Virgin ceramics, with Southern Paiute Brown Ware sherds also well-represented (Seymour 1997). Ceramic data suggest that during the Early Ceramic period (A.D. 300–1000), the outside contacts were with Virgin Branch culture area, located to the east. Later, during the Middle (A.D. 100–1500) and Late Ceramic (A.D. 1500–1800) periods, these contacts shifted to the Patayan area, located to the south. Also during the Middle Ceramic period, Paiute ceramics first appeared in the Las Vegas Valley.

When Euro-Americans first penetrated southern Nevada, it was occupied by related bands of Numic people, the Southern Paiute and the Chemehuevi, who practiced a mixed economy based on gardening and foraging. The earliest historic accounts, made by the Dominguez-Escalante Expedition of 1776, report encounters with southern Utah Paiutes who planted corn, wheat, and squash in irrigated patches of land near creeks (Euler 1966). Throughout the eighteenth and nineteenth centuries, a heavy toll was inflicted on the native peoples by the more powerful, horse-mounted Utes and by New Mexican caravan leaders who raided the relatively

defenseless Paiute camps to secure captives to sell in the slave markets of New Mexico. The population was severely affected by these activities, so that by 1855, when the first non-Indian settlers arrived in Las Vegas Valley, the dislocation of the Paiutes from their traditional campgrounds and gardens along Las Vegas Creek was accomplished without violence.

Traditionally, the Historic period (1540–1950) in this region begins with the arrival of the Spanish in New Mexico. While the physical presence of the Spanish was not directly felt here, the influence of the foreign intruders far to the south affected relationships among native groups throughout the Southwest and in California (Knack 2001), including this portion of the Mojave Desert. As early as 1714, New Mexican traders used Ute trails linking New Mexico and southern Utah. In southern Nevada, the early contacts were ephemeral, resulting from passage through the region by Euro-American explorers, traders, and trappers seeking a feasible route from the Rocky and Wasatch Mountains to California. Not until circa (ca.) 1825, when mountain men and fur trappers began to probe the region for a route to the southern California coast, was there direct contact between these groups and the southern Paiutes. Jedediah Smith, Peter Skene Ogden, Thomas L. "Pegleg" Smith, among others, safely passed through the region. On the basis of their reports, Antonio Armijo, a merchant from Santa Fe, conducted the first commercial caravan to reach Los Angeles in 1829. His success spurred the development of the Old Spanish Trail through Las Vegas Valley and across the Spring Mountains to the Amargosa River, the basis for the subsequent Mormon Road of the mid to late nineteenth century.

Settlement of Las Vegas Valley by Latter-Day Saints (Mormons) in 1855 significantly increased pressure on the native people and the resources of the region. Southern Nevada has few areas where agriculture is feasible, but the complex geology of the region contains numerous valuable ores and minerals. The first lode mine worked in Nevada was opened in 1856 by the Mormons seeking lead on a mountain later known as Olcott (Wheeler 1869) and then Potosi. The Mormons built a smelter at the site and produced several wagonloads of lead. The lead proved too brittle to mold into bullets, so the mine was abandoned in 1857 when the settlers left Las Vegas and returned to Utah. The mine was reactivated briefly and renamed "Potosi" between 1860 and 1862 by prospectors who thought the brittle ore from the Mormon mine might be silver. The mining district organized by these men was called Potosi.

Non-Mormons assigned to Fort Mohave, along the Colorado River near Needles, prospected for ore bodies throughout the region. They located significant claims in the late 1850s in El Dorado Canyon, north of the fort on the Nevada side of the river. One of the El Dorado Canyon miners was Joseph Good, who ranged the mountains of eastern California and northern New Mexico seeking precious-metal lodes. (From 1848–1863 this region was part of the Territory of New Mexico; from 1863–1867 this region was part of the Territory of Arizona.) Good was one of the organizers of the New England Mining District, which attempted unsuccessfully to mine silver at Potosi in 1868. Good also ran cattle, which watered at the small spring that erupted in the foothills of the Spring Mountains southeast of Potosi. The spring became known as Good's Spring, the name later adopted by the mill town founded there in the early twentieth century.

Other prospects found in the mountains near Good's Spring attracted the attention of some of the West's major mining moguls and investors, including A. G. Campbell of Salt Lake City and George Hearst of San Francisco. Claims were filed by these prospectors, and many others, on lead, zinc, gold, silver, copper, cobalt, platinum, molybdenum, canadium, palladium, and barite. Lead and zinc proved the most valuable of all the ores, and in the early twentieth century, the Yellow Pine Mine was ranked the highest producer in the United States (Longwell et al. 1965). Only in 1905, when a female mining engineer recognized that zinc was the major component of the Potosi ores, did that mine become an important producer. By then it was included in the Yellow Pine Mining District, located a few miles northwest of Good's Spring. The Yellow Pine Mining District was informally organized in 1868 and named for its principal mine. Wagon roads that linked Good's Spring and the nearby mines to the outside world headed north to Las Vegas Valley via Goodsprings Valley

[illegible]

[illegible] While the physical [illegible] Thomas L. "Pegleg" Smith [illegible] Spring Mountains [illegible] nineteenth century.

Settlement of Las Vegas Valley [illegible]

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[illegible]

and Cottonwood Pass, west to Pahrump via Mesquite (Sandy) Valley, south to Ivanpah via Roach Lake, and east to the Colorado River and El Dorado Canyon via the McCullough and New York Mountains.

The Yellow Pine Mining District was severely handicapped in reaching its potential because it was so isolated from any affordable form of transport to smelters and markets. The road network that served the district was composed of roads broken through by use, not engineered to provide a solid roadbed for heavy wagonloads of ore. Early in its development, the ores were transported by wagon to El Dorado Canyon and then shipped by barge downstream, but transportation costs to the barges made full production uneconomic. Construction of the San Pedro, Salt Lake, and Los Angeles Railroad located 7 mi from Good's Spring finally opened up the area to greater development. The railroad, completed in 1905, built a siding known as Goodspring Junction to accommodate the expected shipment of ores from the Yellow Pine District to the west. By 1905 there was a small mill operating in Good Spring. Within a few years, the Yellow Pine Mining Company bought the mill and enlarged its capacity. In 1911 the mining company completed a narrow-gauge railway that linked the mine to the mill and transported the concentrated ores down to the main line at Goodsprings Junction, soon renamed Jean (Myrick 1963). The railroad, a small operation that never carried passengers, hauled ores from 1911 until the Great Depression of 1929 finally caused mining to cease. In 1934 the rails were taken up (Myrick 1963).

When interest in the Yellow Pine District stirred again at the outbreak of World War II, lead and zinc were again the principal ores of interest. The United States ordered a stockpile of these ores to be maintained at Jean, but transport of the ores was made by truck since the small railroad had been dismantled. The stockpile was no longer needed after the war, and mining again was suspended. In the 1950s, the search for uranium and other radioactive ores brought new prospectors to the region, but no economically important ores were located in the Yellow Pine District. Since then, the town (now known as Goodsprings) has maintained a population that fluctuates between 180 and 220 people. Today there are no commercial establishments in town other than the historic Pioneer Bar (est. 1913) and an adjacent gift shop located in the structure that began as the Good Spring Cafe (est. 1913).

3.6.2 Cultural Resource Inventory

The cultural resource inventory began with a records search at the Harry Reid Center for Environmental Studies, Barrick Museum of Natural History, University of Nevada, Las Vegas. Historic maps and records were also examined at the University of Nevada, Las Vegas, Lied Library, Special Collections; the University of Nevada, Reno, Mackey School of Mines Library; and the BLM. The record search revealed that 14 archaeological sites within one mile of the proposed project area (Table 3-4, p. 3-40) were recorded as a result of 19 archaeological inventories (Table 3-5, p. 3-40). The known archaeological sites consist of prehistoric camps, roasting pits, chert quarries, and rock shelters; historic artifact scatters and refuse dumps; the railroad grade for the railroad to the Yellow Pine Mine; and the Yellow Pine Mine. One historic site, the Goodsprings Schoolhouse, is listed on the National Register of Historic Places (NRHP). This site is located at least 1 mi from the project area.

The VEA 230-kV transmission line ROW was intensively inventoried for cultural resources in 1994. This survey resulted in the identification of six archaeological sites (26CK4042 and 26CK5082-5086) including a lithic scatter (25CK5083), a lithic quarry (26CK5084), a roasting pit (26CK5085), a rock-shelter/roasting-pit complex (26CK5086), a historical-trash/prehistoric-lithic quarry (26CK5082), and the Yellow Pine Mine Railroad berm (26CK4240). All the sites, except for 26CK5086, were determined ineligible for nomination to the NRHP. Site 26CK5086, which is eligible to the NRHP, is located a few hundred meters north of the transmission line corridor, and it was avoided during the construction of the transmission line.

- The intensive field inventory of the proposed WTG locations, service and access roads, meteorological towers, laydown, and substation location was surveyed by one to two archaeologists walking along the

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[illegible]

3.8.2 Cultural Resources Inventory

[illegible]

[illegible]

- [illegible]

Table 3-4. Previously Identified Archaeological Sites near the Proposed Action and Alternatives.

Site Number	Period	Site Type	Eligible to the NRHP
26CK2390	Historic	Yellow Pine Mine	Undetermined
26CK2391	Historic, pre-1922	Artifact Scatter	Undetermined
26CK2392	Historic, 1911–1913	Railroad Line	Undetermined
26CK2393	Historic, 1901–1912	Artifact Scatter	Undetermined
26CK2394	Historic, post-1902	Artifact Scatter	Undetermined
26CK2625	Prehistoric	Lithic Scatter, Cave, Spring	Undetermined
26CK4042	Historic, 1911–1934	Railroad Grade	Not Eligible
26CK5082	Prehistoric, Historic	Chert Assay/Quarry, Trash Scatter	Not Eligible
26CK5083	Prehistoric	Lithic Scatter	Not Eligible
26CK5084	Prehistoric	Chert Assay/Quarry	Not Eligible
26CK5085	Prehistoric/early Historic	Roasting Pit	Not Eligible
26CK5086	Prehistoric	Rock Shelter, Roasting Pits	Eligible
26CK5624	Historic, 1930s–1950s	Refuse Dump	Not Eligible
26CK5625	Historic	Trash Scatter	Not Eligible

Table 3-5. Previous Archaeological Surveys in the Area of the Proposed Action and Alternatives.

Report No.	Organization	Purpose
5-37-10	ARC, UNLV	Phillips Petroleum lines 2, 3, and 4
5-37-8	ARC, UNLV	Phillips Petroleum line A
5-71(P)	BLM	Unknown
5-80(N)	BLM	Bell telephone repeater station
5-158(N)	BLM	Corps of Engineers Potosi Mountain
5-368(N)	BLM	Table Mountain communication site
5-474(N)	BLM	Communication site ROW
5-648(P)/5-25-10	ARC, UNLV	Seismic line
5-857(P)	BLM	Gravel pit
5-961(W)	BLM	U.S. Air Force temporary communication site
5-1043(P)	BLM	Frontier-500 Off-Road Race
5-1737(P)	Dames & Moore	Kern River Gas transmission line
5-1948(P)	BYU	Wycal pipeline corridor
5-2203	Dames & Moore	Goodsprings flood control facility
5-2248(P)	S&S	Valley Electric Association electric transmission line
5-2261(N)	BLM	Solid waste transfer stations
5-2378/3-4-4	HRC, UNLV	Community park

proposed corridor spaced no more than 100 ft apart. The survey resulted in the identification of 25 archaeological sites (Table 3-6, p. 3-42) located within the APE. Site types include:

- Mines (4)
- Mines with habitation features (4)
- Historic roads (1)
- Historic trash scatters (2)
- An airway beacon (1)
- Prehistoric temporary camps (2)
- Prehistoric lithic scatters (6)
- Rock shelters (2)
- Rock feature site (1)
- Prehistoric roasting mound (1)
- Toolstone procurement site (1)

Two of the sites (26CK6463 and 6475) contain both prehistoric and historic components. Four named mines, including the Argentena Mine, the Fredrickson Mine, the Lookout Mine, and the Snowstorm Mine, are in the APE. Lead, zinc, vanadium, copper, and gold were recovered at these mines between 1887 and 1962. Foundations and domestic trash suggest the Argentena Mine, the Fredrickson Mine, the Lookout Mine, and 26CK6461 also served as habitations. Eligibility determinations have not yet been made for the archaeological sites. Recommendations for eligibility are included in Table 3-6 (p. 3-42). The final determinations will be included in the FEIS.

3.6.3 Traditional Cultural Properties

In 1992, TCPs were made eligible for protection under the NHPA. These include areas that have religious, ceremonial, medicinal, or historic importance to Native American tribes. In addition to the archaeological surveys, the potential for impacts on TCPs was considered. The Spring Mountain range is currently under study for nominations as a TCP; however, the evaluation is in the early stages of study. No other known TCPs are located in the vicinity of the proposed undertaking.

Consultation with the Native American groups was initiated on August 16, 2001, to determine if TCPs are located in the APE. The BLM has notified the Moapa Paiute Tribe, the Pahrump Paiute Tribe, the Chemehuevi Indian Tribe, the Colorado River Indian Tribes, the Kaibab Paiute Tribe, Las Vegas Paiute Tribe, and the Paiute Indian Tribes of Utah of the proposed project. Requests for formal consultation have been received by the BLM from the Chemhuevi and the Fort Mojave Indian Tribes. Results of this consultation process will be included in the FEIS.

3.7 Transportation and Circulation

This section contains analyses of existing traffic and circulation conditions within the project area, including peak traffic conditions, and describes the existing and proposed roadway network.

Table 3-6. Archaeological Sites Recorded during the Intensive Survey for the Proposed Action and Alternatives.

Site Number	Temporal Period	Site Type	NRHP Eligibility Recommendations
26CK6451	Prehistoric	Artifact Scatter/Temporary Camp	Eligible
26CK6452	Prehistoric	Lithic Scatter	Not Eligible
26CK6453	1887–1962	Argentena Mine	Eligible
26CK6454	Prehistoric	Lithic Scatter	Not Eligible
26CK6455	Prehistoric	Rock Shelter	Not Eligible
26CK6456	Prehistoric	Lithic Scatter	Not Eligible
26CK6457	Prehistoric	Artifact Scatter/Temporary Camp	Eligible
26CK6458	Prehistoric	Lithic Scatter	Not Eligible
26CK6459	Prehistoric	Basalt Quarry	Eligible
26CK6460	Prehistoric	Rock Shelter	Not Eligible
26CK6461	1904–1905	Mine, Trail, and Mining Camp	Not Eligible
26CK6462	1893–1946	Lookout Mine	Eligible
26CK6463	Historic (1935) and Prehistoric	Airway Beacon Lithic Scatter	Not Eligible
26CK6464	1880–1960	Can Concentration and Rock Alignments	Not Eligible
26CK6465	Unknown	Rock Feature	Not Eligible
26CK6466	Prehistoric	Lithic Scatter	Not Eligible
26CK6467	Prehistoric	Lithic Scatter	Not Eligible
26CK6468	1905–1960	Mine	Not Eligible
26CK6469	1897–1926	Fredrickson Mine	Eligible
26CK6470	1905–1920	Snowstorm Mine	Not Eligible
26CK6471	1880–1960s	Road and Trash Scatter	Not Eligible
26CK6472	Prehistoric	Roasting Mound and Rock Features	Eligible
26CK6473	Historic	Mine	Not Eligible
26CK6474	1905–1950	Mine	Not Eligible
26CK6475	1917–1929 and Prehistoric	Trash Scatter Chert Procurement	Not Eligible

Transportation routes are evaluated in terms of level of service (LOS). The LOS is a qualitative measure based on existing roadway capacity and traffic volumes. It describes the operating conditions of a defined segment of roadway or intersection. The variables that affect traffic flow include factors such as travel speed, travel time, vehicular delays, motorist sight distance, traffic interruptions, and the freedom to maneuver. The six levels of service range from "A" to "F." Level A is defined as being ideal flow conditions with little or no delays, whereas extreme delays and gridlock characterize level F. Each level is used to describe traffic flow in terms of delays experienced by the motorists (see Appendix F, Traffic Support Data, for LOS definitions and existing LOS calculations).

Existing conditions in the vicinity of the project area were observed and evaluated, and relevant data including lane configuration, traffic controls, and peak generator hour traffic counts was obtained. Current and future traffic characteristics and levels of service at the intersections impacted by the site have been determined by these existing conditions.

3.7.1 Roadway Network

I-15, SH 161, Sandy Valley Road, and Wilson Pass Road provide access to the area. Access to the facilities would be provided by existing dirt roads and new roads. Some of the existing roads currently provide access to microwave towers, radio towers, a weather station, electric transmission lines, and numerous mining claims. Existing and proposed roads providing the internal access network would be upgraded to Clark County road standards to provide access for construction and O&M activities.

The existing intersection of SH 161 and Sandy Valley Road is a 3-legged stop-controlled intersection with stop control on the south approach. The south approach consists of a shared left/right turn lane and a shared left/through lane. The north approach consists of a shared through/right turn lane.

The existing intersection of I-15 Southbound and SH 161 is a 3-legged stop-controlled intersection with stop control on the north leg (I-15 southbound off-ramp). The north approach consists of a shared left/through lane and a separate right turn lane. The west leg consists of a shared through/right turn lane, and the east leg consists of a shared left/through turn lane.

The existing intersection of I-15 Northbound and SH 161 is a 3-legged stop controlled intersection with stop control on the south leg (I-15 northbound off-ramp). The south approach consists of a shared left/through lane and a separate right turn lane. The west leg consists of a shared left/through turn lane, and the east approach consists of a shared through/right turn lane.

3.7.2 Average Daily Traffic Volumes

Average weekday traffic volumes were obtained from the Nevada Department of Transportation's (NDOT) Annual Traffic Report (NDOT 1999) and from counts taken in March 2000. These volumes were used in determining the growth trend for the area of the site. The area-wide average growth per year of 2.95% was incorporated into the existing counts to establish anticipated future traffic volumes at buildout of the site. Growth-rate calculations can be found in Appendix F.

3.7.3 Weekday Peak Hour Traffic

Peak hour traffic counts were conducted on April 26, 2001, during the A.M. and P.M. peak weekday period. These peak hour counts were utilized in assessing roadway capacities and LOS at the intersections of SH 161 and Sandy Valley Road, I-15 Southbound and SH 161, and I-15 Northbound and SH 161.

3.7.4 Existing Intersection Levels of Service

LOS analyses were conducted for existing traffic flows at the intersections of SH 161 and Sandy Valley Road, I-15 Southbound and SH 161, and I-15 Northbound and SH 161 using techniques described in the 1997 Highway Capacity Manual (Transportation Research Board 1998). Results of the analysis, which are detailed in Appendix F, show all of the intersections are currently operating at acceptable LOS.

3.8 Climate and Air Quality

3.8.1 Climate

The project area is located in the southwestern desert region of Nevada and the northeastern portion of the Mojave Desert. Climate in the Mojave Desert is usually characterized by high temperatures and low precipitation throughout the year. The region is characterized by warm, dry winters, and hot summers with occasional thunderstorms. Surface evaporation rates are extremely high, even in wet years. Temperatures and

3.7.1 Roadway Network

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[illegible]

[illegible]

[illegible]

3.7.2 Average Daily Traffic Volumes

[illegible]

3.7.3 Weekday Peak Hour Traffic

[illegible]

3.7.4 Existing Roadway Levels of Service

[illegible]

3.8 Climate and Air Quality

3.8.1 Climate

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amounts of precipitation are dependent on elevation, with lower elevations generally experiencing the warmest temperatures and receiving the least rainfall. Temperatures vary significantly along elevation gradients and may decrease approximately 5.3°F for every 1,000-ft increase in elevation. Daily and seasonal temperatures can vary greatly. Daytime to nighttime temperatures may vary by 20 to 30°F in the winter and 30 to 40°F in the summer. Maximum temperatures in the summer exceed 100°F at the lower elevations. Minimum winter temperatures drop below freezing at the higher elevations. There is approximately a 2,200-ft elevation range within the project area, leading to significant differences in temperatures.

The project area sits in the rainshadow of the Sierra Nevada Range, the Kingston Range, and the Clark and Mesquite Mountains to the west. As a result, moisture associated with storms originating in the Pacific Ocean infrequently reaches the project area. During the winter, widespread frontal systems produce rain at the lower elevations and snow at the higher elevations. During the late summer, precipitation occurs primarily in the form of brief, localized thunderstorms. The amount and timing of precipitation varies greatly from year to year.

The average annual precipitation in the proposed project area based on weather station data is less than 10 in per year. Most of the weather station data available in Nevada is from stations located in valleys instead of ridge tops. The closest national weather station to the proposed site is at Red Rock Canyon State Park (Station No. 266691), which lies 6.5 mi north of the project area. The weather station is located at latitude 36.05, longitude 115.27, and an elevation of 3,780 ft above msl.

Using measurements taken over the period from 1977 to 2000, the average annual precipitation for the Red Rock Canyon State Park is 12.11 in. March has the highest average precipitation at 2.34 in, followed by February at 2.16 in and January with 1.79 in. The least amount of precipitation occurs in June, with a scant average of 0.15 in. Temperatures range from an average daily maximum of 53°F in January to 96.6°F in July. Average daily minimum temperatures range from 29.8°F in December to 83.3°F in July.

The National Renewable Energy Laboratory has classified the wind energy resources available in the Spring Mountain Range as Class 5 (Elliot et al. 1986). A Class 5 rating is equivalent to a mean wind speed of 13.4 mph at sea level. Generally, wind speeds in this region reach their maximum during the spring.

3.8.2 Air Quality

The Proposed Action and alternatives are located in portions of the Ivanpah Valley and Pahrump Valley air sheds, as shown in Figure 3-12 (p. 3-45). The Pahrump Valley and the Ivanpah Valley air sheds are deemed attainment and/or unclassified for all criteria pollutants (carbon monoxide [CO], nitrogen dioxide [NO_2], sulfur dioxide [SO_2], lead, particulate matter [PM], and ozone [O_3]) (National Department of Conservation and Natural Resources [NDCNR] 2000). An unclassified area does not have enough air quality monitoring data to determine whether the area is in attainment with the standards. For regulatory purposes, unclassified areas are assumed to be in attainment. Unclassified areas typically are remote or sparsely populated regions.

The Clark County Air Quality District has classified the Ivanpah Valley air shed as a management area for nitrogen oxides [NO_x] and volatile organic compounds [VOCs], pollutants that are precursors to ozone formation (Clark County 1996). O_3 is the only criteria pollutant not directly emitted into the environment, but formed in the environment from the photochemical reaction of NO_x with VOCs. The rate of formation of O_3 depends on temperature and the presence of ultraviolet radiation. Because O_3 is not directly emitted from a source, the magnitude of VOC and/or NO_x emissions are used as surrogates to determine if an emission source might be a major contributor to the ozone level. In the Ivanpah Valley air shed, stationary sources that emit either VOCs or NO_x must incorporate best available control technology (BACT) to reduce these emissions (EPA 1995).

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8.0.2 Air Quality

The Proposed Action [illegible]

The [illegible] County Air Quality [illegible]

[illegible]

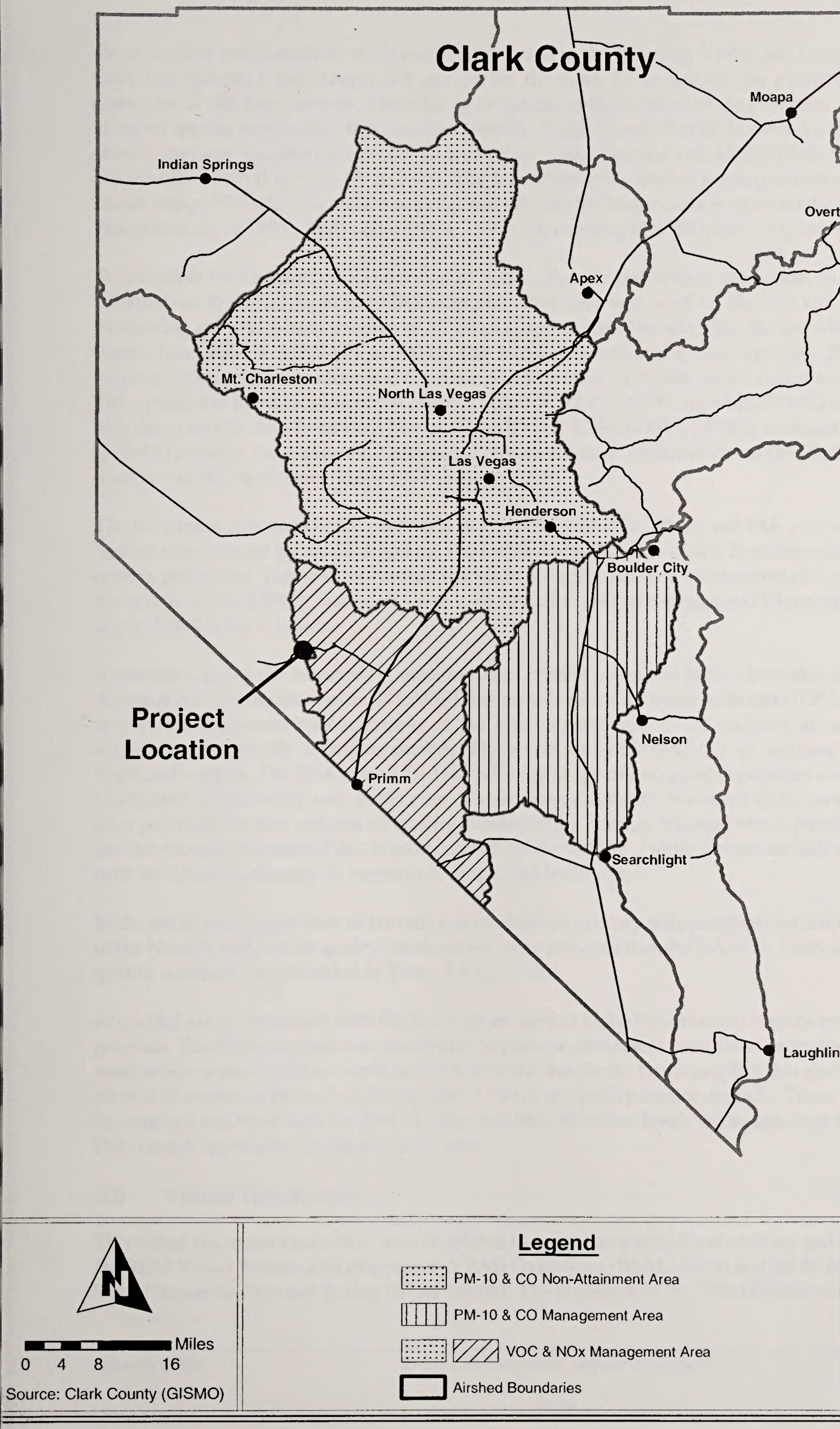

Figure 3-12
Special Management Airsheds for Clark County, Nevada

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Fax: 702/263-7200

11/21/01 MC \\VEGAS-GIS\Projects\TableMtnWindPwr\Figure3-12.mxd

There are few major sources of air pollutants located in the Pahrump Valley and Ivanpah Valley air sheds. Only one source, a gas compressor station for the Kern River natural gas pipeline, has potential NO_x emissions of 242 tons per year. The existing air quality at the location of the Proposed Action was evaluated using air quality monitoring data obtained from the Clark County Health District Air Quality Division. The closest division monitoring station is located in Jean, Nevada (SLAMS/SPMS Station Identification No. 32-003-1019) (Figure 3-13, p. 3-47). The Jean Monitoring Station lies approximately 6.5 mi southeast of Goodsprings, Nevada. The station is a regional site and has historically monitored the following pollutants: PM_{10} (starting in 1995), $PM_{2.5}$ (starting in 1997), O_3 (starting in 1998), and NO_2 (starting in 1998).

To establish background concentrations of sulfur dioxide and carbon monoxide, the EPA's Aerometric Information Retrieval System (AIRS) Graphic Web site was used to identify CO and SO_2 air quality monitoring stations within a radius of 25 mi of Goodsprings, Nevada. Data for the AIRS Graphic Web site comes from EPA's AIRS (EPA 2001). The latest data extraction was April 20, 2001. No CO or SO_2 monitoring stations were identified from the AIRS Graphic Web site, so the radius was increased to 50 mi. This resulted in identification of the Maycliff (ID No. 32-003-0539, SLAMS/SPMS) monitoring station for SO_2 data and CO data from Paul Meyer Park (ID No. 32-003-0043, SPMS) monitoring station. Table 3-7 (p. 3-48) presents the maximum background concentration of pollutants from the Clark County Monitoring Stations for the monitoring years 1997 through 1999.

The maximum monitored concentrations of O_3, NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$ are all well below the air quality standards set by the EPA and the state of Nevada. Thus the area is considered as "attainment" for all criteria pollutants. The state of Nevada has more stringent ambient air standards for CO concentrations at elevations above 5,000 ft; however, there is no available data on background CO concentrations at elevations above 5,000 ft for this area.

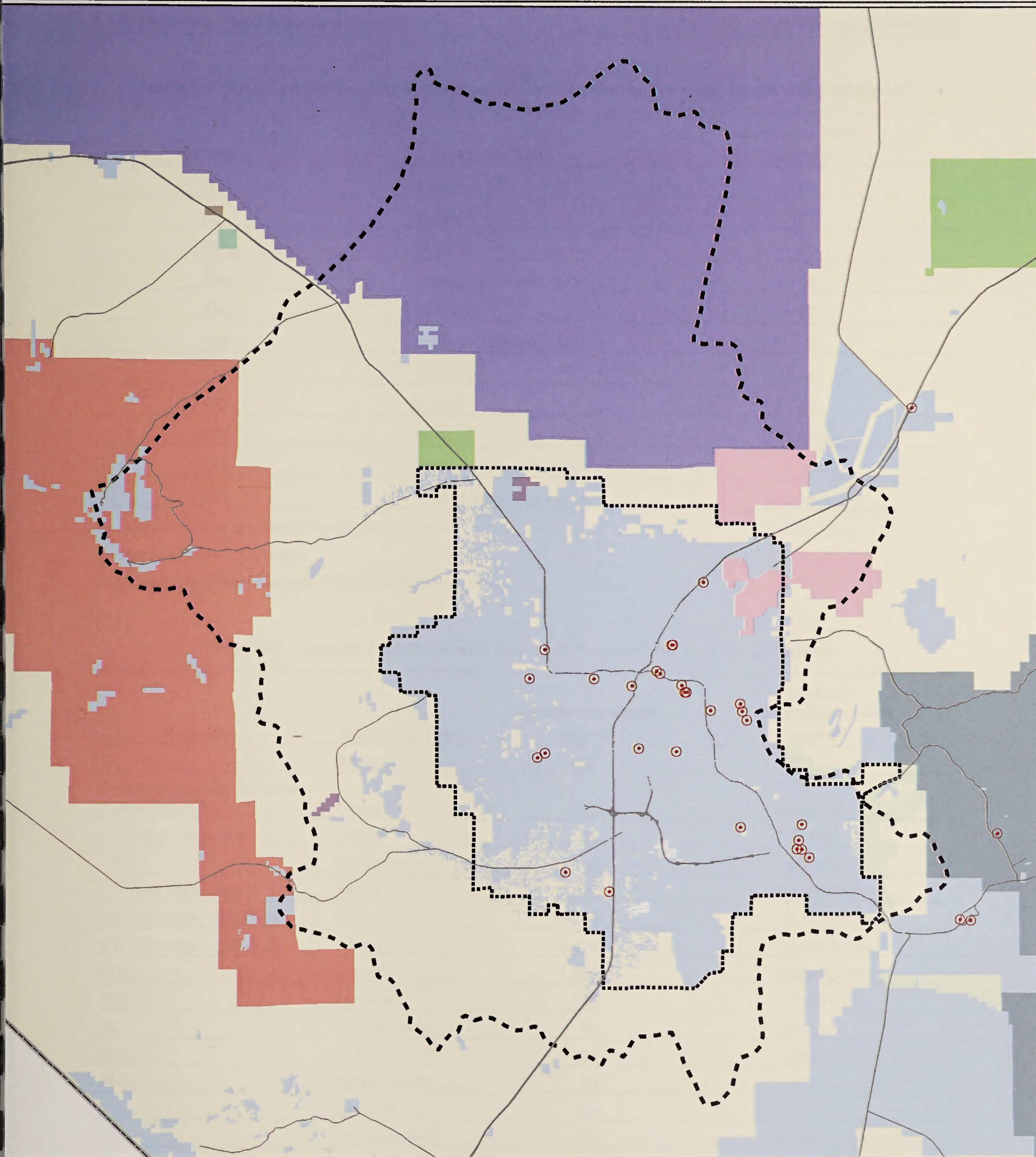
Attainment means the measured concentration of criteria pollutants in the air shed is less than the National Ambient Air Quality Standards (NAAQS) that have been set for those pollutants (EPA 2001). The NAAQS specify the maximum concentrations of the criteria pollutants in the ambient air and the frequency of occurrence for specific averaging periods. The levels set by the NAAQS are assumed to protect the public heath and welfare. The EPA established the NAAQS to specify acceptable pollutant concentrations that may be equaled continuously and, in the case of short-term standards, exceeded up to once per year. Typically, each pollutant has two ambient air quality standards: the primary standard that is protective of public health and the secondary standard that is protective of public welfare. Public welfare includes quality of life issues such as visibility, damage to vegetation, crops, and buildings.

In the same fashion, the state of Nevada has established primary state standards for ambient air quality. Some of the Nevada ambient air quality standards are more stringent than the NAAQS. Federal and state ambient air quality standards are provided in Table 3-8 (p. 3-48).

Areas that are in attainment with the NAAQS are subject to the Prevention of Significant Deterioration (PSD) program. The PSD program was established to prevent attainment areas from degrading in air quality to the point where concentrations would be just below the standards. To accomplish this goal, the EPA established allowable increases for each pollutant above which air quality cannot degrade. These increases are termed increments, and have been set for PM, SO_2, and NO_2. Baseline levels are established at the time of the first PSD permit application in the proposed area.

3.9 Visual Resources

This visual resources evaluation was completed in accordance with the objectives and methods described in the BLM Visual Resource Management (VRM) Guidelines (BLM 1986a) and the BLM Manual Handbook - Visual Resource Contrast Rating (BLM 1986b). The objective of the VRM Guidelines is to manage public



N

0 1 2 4 6 8 Miles

Source: Base map - US Geological Survey Carson City, NV

Table Mountain Wind Generating Facility

Legend

- Monitoring Stations
- Nonattainment Area and Hydrographic Basin 212 Boundary
- BLM Disposal Boundary

Land Status

- Bureau of Reclamation
- Desert National Wildlife Range
- Humbolt-Toiyabe National Forest
- Indian Reservation
- Lake Mead National Recr. Area
- Nellis Air Force Base
- Nevada Test Site
- Nevada Test and Training Range
- Private
- Public land
- State of Nevada
- State of Nevada-State Park

Figure 3-13
Clark County Department of Air Quality Management Monitoring Station Locations

PBS&J
901 N. Green Valley Pkwy, Suite 100
Henderson, Nevada 89074-7105
Phone: 702/263-7275
Fax: 702/263-7200

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Table 3-7. Ambient Air Quality Background—Clark County, Nevada, Monitoring Stations.[a]

Pollutant	Averaging Time	Maximum Value ($\mu g/m^3$)[b]
O_3	1-hour	183
O_3	8-hour	157[c]
PM_{10}	24-hour	93
PM_{10}	Annual arithmetic mean	16
$PM_{2.5}$	24-hour	17
$PM_{2.5}$	Annual arithmetic mean	6
CO	1-hour	3,894
CO	8-hour	2,405
SO_2	24-hour	52.3
SO_2	Annual arithmetic mean	0.03
NO_2	Annual arithmetic mean	18.8

a. Maximum recorded values between 1997 and 2000.

b. Micrograms per cubic meter.

c. Fourth highest value reported. Did not exceed the standard.

Table 3-8. Nevada Standards and National Ambient Air Quality Standards.

Pollutant	Averaging Time	Nevada Standards ($\mu g/m^3$)	NAAQS Primary/Secondary ($\mu g/m^3$)
O_3	8-hour[a]	NA[b]	157
O_3 (Statewide except Lake Tahoe Basin)	1-hour	235	235/235
O_3 (Lake Tahoe Basin)	1-hour	195	235/235
NO_2	Annual mean	100	100/100
CO (any elevation)	1-hour	40,000	40,000/None
CO (elevation <5,000 ft)	8-hour	10,000	10,000/None
CO (elevation >5,000 ft)	8-hour	6,670	10,000/None
SO_2	3-hour	1,300	None/1,300
SO_2	24-hour	365	365/None
SO_2	Annual mean	80	80/None
PM_{10}	24-hour	150	150/150
PM_{10}	Annual mean	50	50/50
$PM_{2.5}$	24-hour[a]	NA	65/65
$PM_{2.5}$	Annual mean[a]	NA	15/15
Lead	Calendar quarter	1.5	1.5
Hydrogen Sulfide	1-hour	112	None

a. Proposed standard, implementation not finalized.

b. NA = not available.

lands in a manner that would protect the quality of the scenic or visual values of those lands. Public lands have a variety of visual values. These different values warrant varying levels of management. Because it is neither desirable nor practical to provide the same level of management for all visual resources, it is necessary to systematically identify and evaluate these values to determine the appropriate level of management.

The first step of the VRM process is to identify affected landscapes and assign them values. These visual resource values are obtained by considering the quality of the landscape, the sensitivity of the viewers of that landscape, and the distance of that landscape to the viewers. A contrast rating system is then used as a systematic means to evaluate proposed projects and determine the level of impact the project would have on visual resources.

Assigning values to visual resources is a subjective process, yet researchers have found consistent levels of agreement among individuals asked to evaluate visual quality. Modifications in a landscape that repeat the landscape's basic elements are said to be in harmony with their surroundings. Modifications that do not harmonize often appear out of place and are said to contrast or stand out unpleasantly. These basic design elements and concepts were incorporated into the VRM system to lend objectivity, integrity, and consistency to the process. The VRM system is designed to separate the existing landscape and a proposed project into their features and elements and to compare each part against the other to identify those parts that are not in harmony. Mitigation measures are then sought to bring them back into harmony. An understanding of basic design principles and how they relate to the appearance of a project is essential to minimize visual impacts.

3.9.1 Project Facilities Setting

The Proposed Action and alternatives consist of several elements: the WTG corridors, transformers, laydown areas/batch plants, underground and overhead 34.5-kV distribution lines, communications system, access and service roads, and an electric substation. For the purposes of the visual analysis, the site of the Proposed Action and alternatives is defined as all the area to be affected by construction of the WGF and all ancillary improvements and facilities. The area of the Proposed Action and alternatives is generally characterized by mountain ridges ranging from 5,000 ft above msl on Table Mountain to 6,070 ft above msl north of Wilson Pass and sloping down erosional fan remnants to approximately 3,800 ft above msl. The plant communities represented in the project area are Mojave creosote bush scrub, Mojavean blackbrush scrub, wash scrub, and Mojavean pinyon-juniper woodland.

For descriptive purposes, the sites of the Proposed Action and alternatives are separated into four sections, each of which had a unique location, shape, and function. These sections are:

- WTG corridor sites
- Overhead electric distribution line sites
- Access and service road sites
- Electric substation site.

3.9.1.1 WTG Corridor

The WTG corridors include NEG Micon 900 (or comparable manufacturer and type) and NEG Micon 1500 (or comparable manufacturer and type) WTGs, transformers, underground electric collection lines, underground communications lines, and other ancillary improvements within the same area. They would be located along the ridgelines of Table Mountain in the southern end of the project area, Shenandoah Peak in the central portion of the project area, and Potosi Mountain/Wilson Pass at the northern edge of the project area. These sites are covered with well-consolidated sedimentary rock and barren rock outcrops along the

[illegible]

The first step of the VRM process is to [illegible] visually [illegible] [illegible]

[illegible]

3.9.1 Proposed Facilities Setting

The proposed [illegible]

For descriptive purposes, the [illegible] of the Proposed [illegible]

- WTG corridor area
- Overhead electric distribution line [illegible]
- [illegible] and service road [illegible]
- [illegible]

3.9.1.1 WTG Corridor

The WTG corridor [illegible]

ridges consisting of limestone, basalt, and andesite. Vegetation is dominated by species that comprise the Mojavean blackbrush scrub and Mojavean pinyon-juniper plant communities. Visually, these sites appear coarse, limited in contrast, and with some variety of vegetation in varying shades of green, gray, and brown. Overall, it is the adjacent scenery that moderately enhances the overall visual quality due to the connection with a relatively undisturbed panoramic well-consolidated sedimentary rock. These sites are adjacent to various microwave towers, meteorological towers, radio towers, communications facilities, and paragliding ramps.

3.9.1.2 Overhead Electric Distribution Line Sites

The distribution-line sites would traverse the same type of terrain as described for the proposed WTG corridors and then negotiate the 1,000- to 1,500-ft drop down to the valley floor over sandy erosional remnant fan slopes. At the elevation of approximately 4,000 ft above msl, the vegetation is dominated by Mojave creosote bush scrub and wash scrub lending the sites a flat, barren and relatively undifferentiated appearance. Green, gray, and brown are the principal color schemes. At points throughout the project area, the line would parallel existing and improved dirt roads and the existing VEA 230-kVsingle-pole transmission line (extending from the southeast to the northwest across the project site).

3.9.1.3 Access Road and Service Road Sites

The access road corridors follow existing paved and unpaved roads. SH 161 is a two-lane, paved, striped roadway with limited shoulder and in good condition. Sandy Valley Road and Wilson Pass Road are 20-ft wide, unpaved roads with no shoulder and in good condition. Existing unpaved access roads to Table Mountain, Shenandoah Peak, and Potosi/Wilson Pass WTG corridors would be improved and expanded in length. New unpaved roads would be developed throughout the WTG corridor system along the ridge tops would parallel some portions of the overhead distribution system downslope and along the valley floor. The access roads cross through all vegetation communities and are typically gravelly, powdery, and gray and beige in color.

3.9.1.4 Electric Substation Site

The proposed substation site includes transformers and other facilities, including the collector building, step-up transformers, the 230-kV switchyard, and the control building. It would be located within a fenced 10-ac enclosure on the valley floor, southwest of the community of Goodsprings and near the intersection of the VEA 230-kV electric transmission line and SH 161. This flat landscape is dominated by creosote bush scrub, which is underlain and interspersed with light to dark gray gravels and brown and beige desert pavement. This site is adjacent to the existing 230-kV transmission line.

3.9.2 Surrounding Area Setting

The surrounding area has the same characteristic Mojave Desert features as that of the proposed project sites. The mountains and hills present a more barren and rugged appearance than the flat, scrubby valley floor.

Although the area is remote, several manmade features punctuate the viewshed. I-15 and SH 161 traverse the area, adding a wide paved surface and dirt slopes to the natural terrain. Overall, these features do not detract from the natural viewshed; from a distance they are similar to the ribbonlike erosional channel/bajada features that commonly snake through the desert landscape.

Several communities can be seen from the mountain and hilltops within the project area. The community of Goodsprings lies approximately 1 mi northeast of the project area and can be seen from I-15 and SH 161 as an assemblage of brown, gray, and beige low-rise structural shapes and sizes. Jean, lying east of the project area and at the interchange of I-15 and SH 161, is a collection of low- and high-rise structural shapes and sizes ranging in color from subtle desert hues to the bright neon of casinos and other commercial development

lights. On the western edge of the project area lies the community of Sandy Valley, a combination of cluster and sprawl, with brown, beige, gray, and white low-rise structures that blend somewhat into the surrounding flat, scrubby creosote bush desert floor. There are currently plans for the construction of two residential properties near the intersection of Sandy Valley Road and SH 161 that will have a view of the substation. Overall, these manmade features do not detract from the natural viewshed, being low to the ground and blending in with the desert color palette.

3.9.3 VRM Classification

VRM classes represent the visual resource management objectives of acceptable visual change within a characteristic landscape. A class is based on three factors: scenic quality evaluation, sensitivity analysis, and delineation of distance zones. The relative value of the visual resource is indicated by one of four classes. Classes I and II are the most valued, Class III represents a moderate value, and Class IV is of least value. The following VRM objectives are established for each of the classes:

- *Class I.* The objective of Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. This class includes primitive (wilderness) areas, some natural areas, wild sections of national wild and scenic rivers, and other congressionally and administratively designated areas where decisions have been made to preserve a natural landscape.

- *Class II.* The objective of Class II is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the causal observer. Any changes must repeat the basic element of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

- *Class III.* The objective of Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape can be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. As in Class II, changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

- *Class IV.* The objective of Class IV is to provide management activities that require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Based on scenic quality, viewer sensitivity, and distance zones, VRM classes for the site of the Proposed Action and alternatives were determined by the BLM during the development of the BLM RMP (BLM 1998). Two classes apply to the areas that would be affected by the Proposed Action (Figure 3-14, p. 3-52). Class II has been assigned to the areas of Shenandoah Peak and Wilson Pass. Class III has been assigned to the area of Table Mountain.

Additionally, BLM has identified that the VRM Objective VS-1 applies to the Proposed Action. VS-1 directs to "limit future impacts on the visual and aesthetic character of the public lands." Management direction for a Class II area (VS-1-a) is to "manage and retain the landscape's existing character. In these areas, authorized actions may not modify existing landscapes or attract the attention of the casual viewer." Management direction for a Class III area (VS-1-b) is "...for partial retention of the existing character of the landscape. In these areas, authorized actions may alter the existing landscape, but not to the extent that they attract or focus attention of the casual viewer."

[illegible]

3.6.3 VRM Classification

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

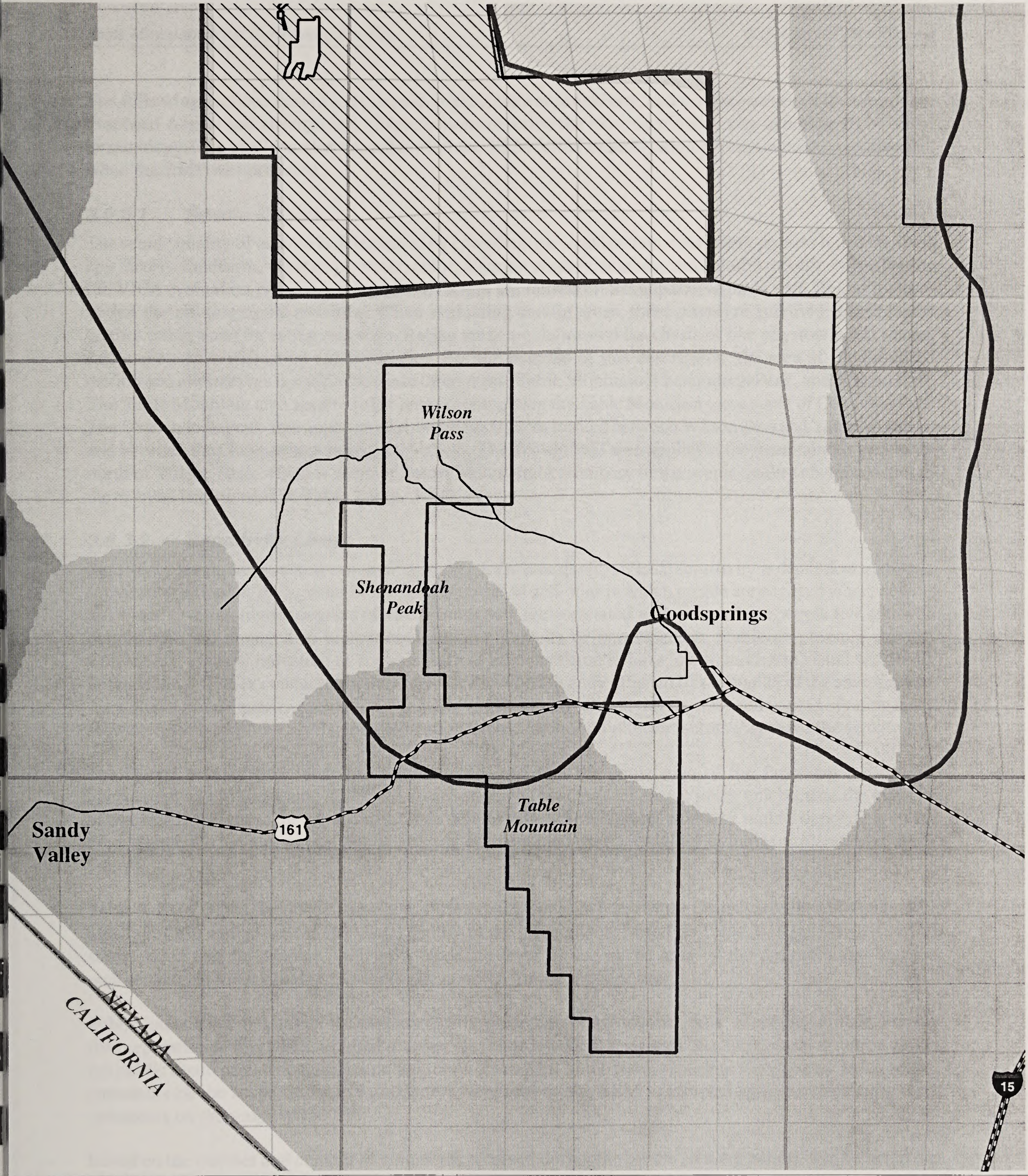

Figure 3-14
Visual Resource Management Classes of Affected Area

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The following sections describe the scenic quality, viewer sensitivity, and distance zones of the area of the Proposed Action and alternatives. These sections describe the existing resources by using the BLM VRM terminology. The sections also describe what the BLM VRM classification process would have involved when the RMP was prepared.

3.9.3.1 Scenic Quality

The scenic quality of an area is determined by completing a visual resource inventory process based on seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. During the VRM evaluation process, each of these factors are ranked on a comparative basis with similar features within the physiographic province. When evaluating certain areas, those areas are subdivided into scenic quality rating units for rating purposes. Rating areas are delineated on a basis of like physiographic, visual, and manmade modification characteristics. For the purpose of this description, the area of the Proposed Action and alternatives is subdivided into three areas: Table Mountain, Shenandoah Peak, and Wilson Pass. The Table Mountain area applies to the area encompassing the Table Mountain mesa south of Columbia Pass. The Shenandoah Peak area applies to the mountainous area located between Wilson Pass and Table Mountain and between the Goodsprings and Sandy Valleys. The Wilson Pass area applies to the mountainous area to the north of Wilson Pass, which is south of Potosi Mountain. A summary of the scenic quality characteristics of these areas is presented in Table 3-9 (p. 3-54).

3.9.3.2 Sensitivity Level

Sensitivity levels are a measure of public concern for scenic quality. Visual sensitivity is dependent upon user (or viewer) attitudes, the amount of use, and the types of activities in which people are engaged when viewing an object. Overall, higher degrees of visual sensitivity are correlated with areas where people live and with people who are engaged in recreational outdoor pursuits or participate in scenic or pleasure driving. Conversely, areas of industrial or commercial use are considered to have low to moderate visual sensitivity because the activities conducted in these areas are not significantly affected by the quality of the environment. As with the scenic quality evaluation, the VRM sensitivity-level analysis requires delineation of rating units. However, for sensitivity levels, the delineation should be based on those factors that drive the sensitivity.

For the purpose of this summary, it was determined that the entire area of the Proposed Action and alternatives would be located within the same sensitivity level project area or rating unit because the majority of the area is subject to the same users. Once delineated, each rating unit would be ranked depending on the type of user, the amount of use, public interest, adjacent land uses, special areas, and consideration of other factors.

Table 3-10 (p. 3-54) provides a summary of the existing types of users of the project area, in addition to their amount of use and interest in the visual quality of the project area. Based on Table 3-10 (p. 3-54), it can be summarized that on average, there is a moderate level of use in the area by the defined users and the maintenance of visual quality is a moderate concern for the average user.

Public interest is a measure of the concern that the project may have to local, state, or national groups. Prior to the preparation of this DEIS, a public scoping was conducted that consisted of a 30-day period during which the public could provide comments on the scope of the EIS. Three public hearings were conducted to solicit comments on the scope of the EIS and letters were sent by the BLM to affected agencies requesting their comments on the scope of the EIS.

Based on the number and content of comments received during the public scoping period, it is believed the maintenance of visual quality is a major issue to those residing in the vicinity of the project area, and on average, the maintenance of visual quality is a moderate issue to the remainder of the public.

Table 3-9. Scenic Quality Summary.

	Scenic Quality Rating Areas		
Key Factors	Table Mountain Area	Shenandoah Peak Area	Wilson Pass Area
Landform	Low, wide mesa is interesting, though not dominant or exceptional	Moderately high peak with interesting erosional patterns; features are interesting but not exceptional	Low foothills with few interesting landscape features
Vegetation	Some variety in vegetation, but does not exhibit interesting forms, textures, or patterns	Some variety in vegetation, but does not exhibit interesting forms, textures, or patterns	Some variety in vegetation, but does not exhibit interesting forms, textures, or patterns
Water	Absent	Absent	Absent
Color	Subtle color variations with limited contrast	Subtle color variations with limited contrast	Subtle color variations with limited contrast
Adjacent scenery	Adjacent scenery moderately enhances the overall visual quality due to the connection to a relatively undisturbed panoramic landscape	Adjacent scenery moderately enhances the overall visual quality due to the connection to a relatively undisturbed panoramic landscape	Adjacent scenery moderately enhances the overall visual quality due to the connection to a relatively undisturbed panoramic landscape
Scarcity	Interesting within the localized area, but fairly common to the region	Interesting within the localized area, but fairly common to the region	Features are very common to the region.
Cultural modification	Modifications are limited and add little to no variety or disharmony.	Modifications are limited and add little to no variety or disharmony.	Modifications are limited and add little to no variety or disharmony.

Table 3-10. User Summary for Sensitivity Level.

Type of User	Amount of Use	Level of Concern
Goodsprings residents	Approximately 230 residents	Maintenance of visual quality is a major concern
Sandy Valley residents	Approximately 1,800 residents	Maintenance of visual quality is a major concern
SH 161 motorists	Between Jean & Goodsprings— 380 vehicles per day (both ways)	Maintenance of visual quality is a moderate concern
I-15 motorists	Between Jean & Primm— Northbound: 20,510 vehicles per day Southbound: 24,572 vehicles per day	Maintenance of visual quality is a low concern
Jean tourists	Nevada Landing occupancy: 85% (300 rooms), approximately 14,000–16,000 people/month. Gold Strike occupancy: 60% (600 rooms), approximately 22,000–24,000 people/month	Maintenance of visual quality is a low concern

Adjacent Land Uses is a measure that takes into account the affect that adjacent uses may have on the visual sensitivity of that area. For example, an area adjacent to an industrial development may not be as visually sensitive as a similar area adjacent to a residential community. In the case of the area of the Proposed Action and alternatives, the lands potentially impacted are part of a larger undeveloped panoramic landscape. The sensitivity of the alteration of those lands in one section of the landscape is high because of its potential affect on the entire panoramic landscape. Therefore, it was determined that maintenance of visual quality to sustain adjacent land use objectives is moderately to very important for the Proposed Action and alternatives.

Special Areas is another element of the sensitivity analysis. This measure takes into account the management objectives of designated areas such as Wilderness Areas, Natural Areas, Wild and Scenic Areas, and Areas of Critical Environmental Concern. None of these areas have been identified within the vicinity of the Proposed Action or alternatives; however, the RRCNCA and the Humbolt-Toiyabe National Forest are located to the north.

3.9.3.3 Distance Zones

Landscapes are subdivided into three distance zones based on relative visibility from travel routes or observation points. The three zones are foreground-middleground, background, and seldom seen. The foreground-middleground zone includes areas seen from highways, rivers, or other viewing locations that are less than 3 to 5 mi away. Seen areas beyond the foreground-middleground zone but usually less than 15 mi away are in the background zone. Other areas are in the seldom-seen zone.

Within the project area, the majority of Shenandoah Peak and northern portion of Table Mountain are within the foreground-middleground zone, except for those areas that are seldom seen due to topography. The remainder of Table Mountain (the southern portion) and the area from Wilson Pass north to Potosi Mountain are within the background zone.

3.10 Noise

Noise is defined as unwanted sound. Noise arises from small pressure fluctuations or vibrations that travel as waves through the air, or any other medium. When the vibrations arrive at the ear, a series of physiological processes convert them into nerve impulses to the brain, which are then perceived as sound. The two properties of sound detected by the human ear are pitch and loudness. Pitch describes the frequency of vibration of a sound wave, usually measured in cycles per second or Hertz (Hz). Doubling the frequency raises the pitch by one octave. Many sources of sound produce a wide mix of sound frequencies that are often referred to as white noise.

Loudness is a very personal, subjective sensation that cannot be measured directly. A compromise is made by measuring the pressure change in the ear caused by the passage of sound. This is measured in decibels (dB). The lowest sound pressure that can be detected by an average human ear is 20 micropascals (μPa) which equates to a 0 dB value. At the other end of scale, a pressure of 200 μPa equals 140 dB, which is the threshold above, which the ear experiences discomfort and pain (The EA 2001). The perceived loudness of a sound is not directly related to the energy of the sound wave, since the sensitivity of the ear varies with the pitch of the sound. The ear is most sensitive to frequencies around 4,000 Hertz (Hz) (4 kiloHertz [kHz]) and is insensitive to frequencies below about 20 Hz or above about 20 kHz. Loudness is therefore determined by both the intensity and frequency of the noise. While an increase of 3 dB in sound level represents a doubling of sound energy, an increase of 10 dB is perceived as a doubling of loudness by the ear (The EA 2001).

The annoyance caused by a particular noise depends not only on its loudness and pitch, but also on the background noise level, the duration of the noise, its repetition rate, the time of day it occurs, and many more social and physiological factors. The annoyance potential of a single pitch (tonal) noise is greater than that of white noise of the same loudness.

Despite the complexity of loudness and annoyance assessment, there are some generally accepted guidelines. Different scales have been devised that attempt to represent human assessment of different noise types. The most common is the A-weighted scale, expressed as dB(A). This scale weights the frequency content of noise to match the ear's sensitivity to medium loudness noises. It is incorporated into most commercially available noise meters. The scale does not correspond closely to annoyance values but it does give some guide and is a widely accepted standard. Table 3-11 (p. 3-56) provides a relation of common noise sources to their corresponding decibel levels.

Environmental noise can affect people both physically and psychologically. Physical damage, such as loss of hearing, is rare outside the work place, since noise is not often concentrated from one source for long enough. However, there is the potential for self-inflicted noise damage from sources such as amplified concerts, which can register up to 120 dB(A), gunfire, or machinery. In the workplace, continuous processes make it more likely that physical damage would occur, especially when the noise is experienced over prolonged periods. Continuous exposure to noise levels above 85 dB(A) can result in some permanent loss of hearing. Employers can be prosecuted for failing to observe health and safety regulations relating to noise.

Outside work, people are mainly affected psychologically. For instance, the seemingly constant low-frequency drone present in inner cities is known to make some people feel mildly depressed. High-frequency noise has also been reported to make people irritable and angry. Noise can interfere with speech and communication and disturb sleep. For these reasons, federal agencies such as the U.S. Department of Housing and Urban Development (HUD), the EPA, and the Federal Highway Administration have set noise level criteria that should be accounted for when a federal action is proposed. For the purposes of this study, HUD's "Acceptable" criteria of 65 dBA during daytime hours and 55 dBA during nighttime hours (10 P.M.–7 A.M.) would be followed (HUD 1983). These levels are evaluated at noise-sensitive receptors. Examples of noise-sensitive receptors could include residences, churches, hotels, libraries, hospitals, parks, and schools.

Table 3-11. Correspondence of Common Noise and Decibel Levels.

Noise Source	Noise level [dB(A)]
Jet engine (75 ft away)	140
Heavy metal band	120
Accelerating motorcycle (25 ft away)	110
Car horn (10 ft)	100
Crowd noise at a football game	90
Printing press	80
Heavy truck (50 ft)	70
Cars (50 ft)	65
Micon NM1500C WTG (3 ft away)	62
Normal speech (3 ft)	60
Dishwasher (next room)	50
Library	40
Threshold of hearing	0

Source: The EA 2001.

The land surrounding the proposed WGF site is largely in federal ownership and is considered undeveloped desert. Existing noise sources in the proposed project's vicinity include traffic noise from I-15, SH 161, Wilson Pass Road, Sandy Valley Road, and noise created from wind. The community of Goodsprings is the only noise-sensitive receptor within 1 mi of the proposed project area. At a one-half mi distance from the NEG Micon WTG, noise levels would be expected to be approximately 33 db(A).

3.11 Recreation

Public lands in and adjacent to the project area provide recreational resources and opportunities for both local residents and visitors. The BLM classifies all land available for recreational purposes according to the Recreation Opportunity Spectrum (ROS). The ROS is a scale of classifications "...used to characterize recreation opportunities in terms of setting, activity, and experience opportunities" (BLM 1998). The ROS classification for public lands within the project area is Roaded Natural. The Roaded Natural class offers roughly equal opportunities for organized, group recreational activities, or recreation in a natural setting, generally away from other human activities. Opportunities for both motorized and nonmotorized recreation are present, but off-highway vehicle use in the project area is limited to existing roads, trails, and dry washes.

The BLM also distinguishes recreational use by the general level of use and management requirements. Special Recreation Management Areas require recreation activity plans and a greater investment in facilities or supervision of more intensive activities. Extensive Recreation Management Areas, on the other hand, offer generally unstructured, dispersed, and low-intensity recreational opportunities with a minimum amount of facilities and management supervision.

The northern boundary of the project area is located approximately 1.3 mi south of the Spring Mountains National Recreation Area, Humbolt-Toiyabe National Forest and approximately 6.5 mi south of the RRCNCA (Figure 3-7, p. 3-11). Approximately two-thirds of the project area (from Sandy Valley Road north) is located within the Red Rocks HMA. Other than the Spring Mountains National Recreation Area and RRCNCA, there are no other local, state, or federal parks or recreation areas within or adjacent to the project area, including:

- No city or county parks
- No state parks
- No state wildlife management areas
- No national parks
- No national monuments
- No national grasslands
- No national wildlife refuges
- No national recreation areas
- No national recreational trails
- No wilderness areas
- No wilderness project areas

- No wild and scenic rivers
- No national natural landmarks.

The project area lands are not located within any Special Recreation Management Areas, but are part of the Southern Nevada Extensive Recreation Management Areas, which emphasizes dispersed and diverse recreation opportunities. In the project area, these opportunities include hiking, camping, limited off-road vehicle use, hunting, nature study, birding, and other low-intensity activities. In addition, there are several wooden platforms along the western rim of Table Mountain that suggest the area is periodically used for paragliding.

3.12 Land Use

3.12.1 General Land Use in the Vicinity

The proposed WGF site is located within a 4,500-ac project area in southern Clark County, Nevada, near the Nevada/California border. The area is approximately 20 mi south of Las Vegas. The vast majority of land within the project area is managed by the BLM, although there are several small private inholdings. Public lands in this area are administered by the Las Vegas Field Office, and all land uses are managed under the Las Vegas RMP (BLM 1998), as mandated by the FLMPA of 1976 (43 CFR 1600). The RMP was developed through the NEPA process and allows for the use of public lands under a multiple-use/sustained-yield philosophy. The RMP consists of a "combination of management directions, allocations, and guidelines that would direct where actions may occur, the resource conditions to be maintained, and use limitations required to meet management objectives." Thus, the RMP is the primary planning document that governs development of the proposed WGF. For all BLM land within the project area, this RMP replaces the Clark County Management Framework Plan (BLM 1998). The BLM is also a signatory to the MSHCP and, under this cooperative agreement, has responsibilities to manage lands for covered species included in the MSHCP. The BLM manages the lands within the project area primarily for recreation, conservation, mining, and scattered communications sites and utility corridors. Table 3-12 (p. 3-59) identifies the various ROW holders within the proposed project area and the status of the ROW grant or application.

Private lands in this area are under the planning jurisdiction of Clark County directly and through the Southern Nevada Regional Planning Coalition, a coalition of Clark County, the Clark County School District, and area cities that was formed to deal with regional planning and growth issues. The Clark County Comprehensive Plan, however, recognizes the special status and circumstances of private inholdings and states that "private inholdings in federally designated areas in Clark County should be acquired by the Federal government through land exchanges or other available funding programs when a 'willing seller/willing buyer' situation exists."

An 80-ft-wide electric transmission line ROW traverses a portion of the project area in a southeast to northwest direction. Portions of the electric distribution line for the Proposed Action and the alternatives would be located within the existing ROW.

The Proposed Action and alternatives would be located primarily on undeveloped public land. Some existing secondary unpaved roads, also located on public and private lands, would be improved. Distribution lines to convey power generated at the WGF to VEA's proposed substation would be located on land managed by the BLM in accordance with the RMP.

- [illegible]
- [illegible]

[illegible]

3.12 Land Use

3.12.1 General Land Use in the Vicinity

[illegible]

[illegible]

[illegible]

[illegible]

Table 3-12. Land and Mineral Actions Pending or Authorized on BLM-Administered Lands.

Serial No.	Applicant/Holder/Lessee	Type Authorization	Act Authorized
NVN 037856	Nevada Power Company	R/W 285003	Authorized 24/57/VAR
NVN 0022045	American Tower Corporation	R/W 285003	Authorized 6/23/92
NVN 072058	Dowers, Jon D.	R/W 380913	Pending 25/57/24
NVN 0053614	LV Metropolitan Police	R/W 286001	Authorized 10/29/96
NVN 072097	The New Chiquita Mine	R/W 380913	Pending 24/57/24
NVN 037856	Nevada Power Company	R/W 285003	Authorized 9/7/88 Amended
NVN 05943801	Oxbow Power Service, Inc.	R/W 280004	Pending 25/58/03
NVN 057100	Valley Electric Association	R/W 285003	Authorized 3/27/01 Amended
NVN 061191	Energy Unlimited, Inc.	R/W 292006	Pending 25/58/03
NVN 071391	Maccoli, Gerald	R/W 380913	Pending 10/15/82
NVN 066150	Sierra Concepts, Inc.	R/W 292006	Pending 25/58/03
NVN 011766	Nevada Bell	R/W 286005	Authorized 6/10/76
NVN 066472	Wind Works, Inc.	R/W 285006	Pending 25/58/03
NVN 054856	Clark County	R/W 281001	Pending 8/8/91
NVN 066778	Western Renewable Energy	R/W 292006	Pending 25/58/03
NVN 051802	Clark County Regional Flood Control District	R/W 289001	Authorized 7/20/90
NVN 073726	Table Mountain Wind Power, LLC	R/W 285003	Pending 25/58/03
NVN 041362	Westower Leasing, Inc.	R/W 286001	Authorized 25/58/04

Source: BLM Case Recordation Serial Register Page, Las Vegas Field Office, 2001.

3.12.1.1 Local Communities/Residential

There are no residential structures, towns, communities, incorporated cities, or other permanent human settlements located within the 4,500-ac project area. The nearest such land uses are the unincorporated communities of Goodsprings, Jean, and Sandy Valley. Goodsprings, with an estimated population of 280 in the year 2000, is located just northeast of the project area on SH 161. Jean (which has no permanent resident population other than a state prison) is located approximately 5 mi southeast of the project area on I-15. Sandy Valley, located approximately 5 mi west of the project area on the Nevada/California border, has an estimated population of 1,508 (Clark County 2000).

3.12.1.2 Transportation

The nearest transportation corridor is I-15, located approximately 5 mi east of the project area. I-15 is a major highway that passes through Las Vegas and connects Salt Lake City, Utah, to the city of Los Angeles, California. Also in the vicinity is SH 161, which connects Goodsprings and the project area to I-15 and Jean. Sandy Valley Road, which is a dedicated and maintained Clark County road, provides access through the southern extent of the project area from east to west, connecting Sandy Valley with Goodsprings. Wilson Pass Road, as it is commonly known, is an undedicated and unimproved Clark County road that connects Goodsprings and Sandy Valley through the northern extent of the project area.

3.12.1.3 Agriculture/Rangeland

The Las Vegas District is divided into 53 separate grazing allotments ranging in size from 90 to 312,000 ac. Of this total, only 19 allotments are considered to have been active over the past 10 years (BLM 1998). Although the project area is located within the Table Mountain Grazing Allotment, no grazing has occurred there in some time. In addition, the recently approved RMP for the Las Vegas District permanently closed this allotment to livestock grazing (BLM 1998). No other agricultural activities are currently practiced within the project area.

3.12.1.4 Forestry

The land within the project area consists primarily of blackbrush scrub vegetation; thus, there is no marketable timber available and no commercial logging.

3.12.1.5 Mining

The project area is located within the Goodsprings (Potosi, Yellow Pine) Mining District. The history of mining in this district goes back to the 1850s, with production peaking in the first quarter of the twentieth century. Significant production declined steadily from that point until the 1950s. There are numerous mining claims within the project area boundary (see Section 3.1.4 for a detailed discussion on types of claims located within the project area). The major resources produced from this area include zinc, lead, copper, cobalt, silver, and gold.

The Las Vegas RMP has classified lands within the project area as having:

- High potential for locatable minerals (uncommon varieties of sand, gravel, stone, pumice, pumicite, cinders, and exceptional clay)
- Low potential for sodium
- Low potential for lands prospectively valuable for oil and gas (but there are no existing oil and gas leases)
- Low potential for mineral material sale.

3.12.1.6 Aviation

The Federal Aviation Administration (FAA) requires a notice of proposed construction in a variety of circumstances to determine whether any new construction would adversely affect safety in air navigation (FAA 1975). One of the triggering criteria is construction in proximity to public or military airports. A review of sectional aeronautical charts and the airport/facility directory covering the project area revealed no existing airports within 20,000 ft (the applicable FAA criteria) of the project area (FAA 2001). The nearest existing airfields are the Jean Airport, located on the east side of I-15, operated by the Clark County Department of Aviation. This facility is approximately 6.5 mi east of the project area boundary. In addition, a new regional airport is being studied approximately 6 mi southeast of the project area, also east of I-15. The proposed Ivanpah Airport would be built on 6,000 ac that Clark County would purchase from the BLM between Jean and the unincorporated community of Primm. The new airport is planned to relieve congestion at Las Vegas' McCarran Airport and could be in operation by 2009 (Las Vegas Review-Journal 2000).

Another FAA criterion triggering the notice requirement is "any construction or alteration of more than 200 ft in height above the ground level at its site." This criterion applies to construction anywhere, not just in the vicinity of airports.

2.12.1.5 Agricultural/Natural Areas

The Las Vegas District [illegible]

[illegible]

2.12.1.6 Forestry

The [illegible]

2.12.1.7 Mining

The [illegible]

The Las Vegas RMP has identified [illegible]:

- High potential for [illegible] and/or commercial [illegible]
- Low potential for [illegible]
- Low potential [illegible]
- Low potential for [illegible]

2.12.1.8 Aviation

The [illegible]

[illegible]

3.13 Public Services, Utilities, and Electric and Magnetic Fields

3.13.1 Public Services and Utilities

3.13.1.1 Domestic Water Service

The project area is not currently served by a public water supply. Residents in the nearby communities of Goodsprings, Jean, and Sandy Valley obtain water from groundwater wells. Water for domestic use and construction activities would be hauled to the site.

3.13.1.2 Domestic Wastewater Disposal

The project area is not served by a municipal wastewater treatment facility. A portable toilet service would be contracted to supply and maintain on-site portable toilets and to dispose of sanitary wastes.

3.13.1.3 Solid Waste Disposal

Solid waste disposal service is not provided to the site. Solid waste generated at the site would be collected in dumpsters obtained from a local sanitation company. Waste materials (e.g., brush, construction materials) would be removed from the area and recycled or disposed of at approved facilities.

3.13.1.4 Natural Gas Service

Natural gas service is not provided within the project area. The Kern River natural gas pipeline is located approximately 1.5 mi east of the project area.

3.13.1.5 Communications Service

Telephone service is not provided in the project area. Cellular phones and mobile phones currently provide the only phone service in the project area. ROW for communications facilities within the project area have been issued to American Tower Corporation (T245, R58E, Sec. 5, 6, 7, 8, 17), Las Vegas Metro Police Department (LVMPD) (T245, R58E, Sec. 05), Nevada Bell (T245, R58E, Sec. 18), and Westower Leasing, Inc. (T25S, R58E, Sec. 04).

3.13.1.6 Electrical Service

Electrical service to the project area is provided by Nevada Power. One electric distribution line serves a radio/communications tower on Table Mountain, and another distribution line serves the communication facilities north of Wilson Pass. A 230-kV electric transmission line owned by VEA is located on the east side of the project area and runs in a southeast to northwest direction. Electricity generated by the proposed WGF would tie into the VEA transmission line via the proposed Table Mountain substation.

3.13.1.7 Fire and Emergency Service

The entire project site is within a full fire suppression area (i.e., wildfires are extinguished as soon as possible) (BLM 1998). Fire management activities are conducted by the BLM under an Initial Attack Management system, which links the level of firefighting response to the resource values within a specific geographic area or suppression area/zone (BLM 1998). However, in most cases, the first responders to fire and/or medical emergencies in the project area would come from the towns of Goodsprings, Sandy Valley, and Jean. Goodsprings' emergency response equipment includes a fire engine, tender, and a squad (quick-dash unit used for minor fire and medical emergencies). Sandy Valley has a paramedic ambulance, a fire engine, tender, and squad. Jean has a paramedic ambulance (Grismanauskas 2001).

Although Goodsprings, Sandy Valley, and Jean would be the first responders in an emergency, the BLM would be notified of any fires that occur. In addition, there may be medical emergencies that the local communities are not equipped to handle. In these cases, specialized rescue teams, such as the Las Vegas High-Angle Rescue Team and LVMPD Rescue Helicopter, would be mobilized (Grismanauskas 2001).

3.12 Public Services, Utilities, and Environmental Health

3.12.1 Public Services and Utilities

3.12.1.1 Domestic Water Supply

[illegible]

3.12.1.2 Domestic Wastewater Disposal

[illegible]

3.12.1.3 Solid Waste Disposal

[illegible]

3.12.1.4 Natural Gas Service

[illegible]

3.12.1.5 Communications Services

[illegible]

3.12.1.6 Electrical Service

[illegible]

3.12.1.7 Fire and Emergency Services

[illegible]

[illegible]

Some firefighting equipment would be located at the substation site and in vehicles. Fire deterrents within the WGF would include access roads, which may serve as firebreaks, and regular clearing of vegetation from areas around transformers, WTG towers, and riser poles.

3.13.2 Electric and Magnetic Fields

Energizing an electric transmission or distribution line generates electromagnetic fields (EMFs) in the vicinity of the conductors (wires). Electric fields (measured in units of kV per meter [kV/m]) and magnetic fields (measured in units called milliGauss [mG]) are created by the flow of electrons in a conductor whenever electricity is generated or transmitted. EMFs are found around any electrical wiring, including household wiring and electrical appliances. Average electric field strength in the home resulting from the use of electrical appliances is typically less than 0.10 kV/m, and average magnetic field strength in the home is typically between 1 and 100 mG. Magnetic fields of tens of hundreds of mGs can be present when one is standing close to appliances that carry high currents. In the middle of rooms, away from wiring and appliances, the average magnetic field is typically less than 1 mG. Table 3-13 (p. 3-62) shows typical EMF strengths for some common electrical appliances. Both electric and magnetic alternating-current fields induce currents in conductors, such as people and animals. These currents, even from the largest power lines, are too weak to be felt. However, some scientists believe that these currents might be potentially harmful and that long-term exposure should be minimized.

The generation of EMFs associated with typical operation of electric transmission lines, in addition to electric appliances, such as hair dryers and electric blankets, has been of concern to the general public for more than 10 years. Hundreds of studies on EMFs have been conducted in the United States and other countries.

Trees and structures can shield an electric field; however, a magnetic field is more difficult to shield. Thus, magnetic fields are of a greater concern to public health and safety. Field strength decreases rapidly with distance. Although power lines can be the major source of magnetic field exposure within a home located close to a power line, no homes are located in the vicinity of the proposed transmission line, WGF, or substation.

EMFs vary in strength and, when associated with transmission lines, are directly related to the magnitude of power flow over the line and the configuration of (e.g., horizontal or delta) and spacing between conductors. In addition, the height of the conductor above ground level and the distance from the conductor affect

Table 3-13. Typical Electric and Magnetic Field Strengths from Common Appliances.

Appliance	Electric Field (kV/m)	Magnetic Field (mG)
Coffee maker	0.030	1–1.5
Electric range	0.004	4–40
Hair dryer	0.040	0.1–70
Television	0.030	0.4–20
Vacuum cleaner	0.016	20–200
Electric blanket	0.01–1.0	15–100

Note: Strengths were measured at a distance of 0.3 m (1 ft), except for the electric blanket, which was measured at a distance consistent with normal use. At a 0.9 to 1.5 m (3 to 5 ft) distance, the magnetic field from appliances is usually decreased to less than 1 mG.

Source: BPA 1989.

measured or calculated field strengths. Because of conductor sag between structures, field strength would be at its lowest value where the conductor is attached to the supporting structures and at its highest value at the low point of the sag.

Under the Proposed Action, low-voltage power generated by WTGs would be combined at a pad-mount transformer, where voltage would be stepped up to 34.5 kV. Power from the transformers would be transferred via underground and overhead collection lines to an electric substation, where the voltage would be again stepped up for delivery to the 230-kV utility transmission lines.

3.14 Hazardous Materials

This section is based on a Phase I Hazardous Materials Environmental Site Assessment (see Appendix G). A review of state and federal regulatory agency hazardous-materials or hazardous-waste databases was conducted for reported locations of a release of hazardous substances to soils and/or groundwater in the project area and vicinity. The purpose of this review was to ascertain the location of existing hazardous materials and the impact those release materials have had on the environment. Additionally, this analysis would define any combined impact of the project and other proximate sites. The lists reviewed included:

- National Priority Lists
- Comprehensive Environmental Response, Compensation, and Liability Information System
- Resource Conservation and Recovery Act—Treatment, Storage, and Disposal sites
- Resource Conservation and Recovery Act—Treatment, Storage, and Disposal facilities ordered to implement corrective actions
- Resource Conservation and Recovery Act—Hazardous Waste Generator List
- EPA Emergency Response Notification System
- Toxic Release Inventory (Title III SARA [Superfund Amendment Reauthorization Act]) List
- State Corrective Action Sites List
- State inventory of Solid Waste Landfill List
- State list of Underground and Above Ground Storage Tank List
- State list of Leaking Underground Storage Tank List

The locations of the Proposed Action and alternatives do not appear on any of the federal or state agency databases reviewed. Outside the search radius, however, there are four sites that were located through this review that are not an environmental concern to the proposed WGF. There is one nongeocoded site listed for Lee Wilder, 2.5 mi west of Kingston Road, in Sandy Valley. There are two radio tower/microwave sites located in the northeastern (approximately 1 mi northeast of Wilson Pass) and south central (Table Mountain) areas of the project area. Both of these sites are listed for aboveground fuel storage tanks for emergency power generators. There is also one nongeocoded leaking underground storage tank site listed at Mt. Potosi; however, this site is outside the search radius and not an environmental concern with regards to the proposed WGF.

The Phase I analysis for the Proposed Action site included review of topographical maps and aerial photographs to identify any historic or current features that may be of concern. No sites or other items were identified that would represent a potential for hazardous material issues in the vicinity of the Proposed Action.

A reconnaissance of the project area and the vicinity was conducted on May 24 and 25, 2001. The survey area covered the Proposed Action, alternatives, and adjoining properties. The project area contains a large number of abandoned mine shafts and tailing piles. The VEA 230-kV electric transmission line traverses the northern part of the site (near Wilson Pass) in a northwest to southeasterly direction.

During the site reconnaissance, no dumped chemical containers, hydrocarbon-stained soil, standing water, or unusual odors were noted. There was no visible evidence of prior agricultural or landscaping activity in the site. Therefore, there is no reason to believe significant use of pesticides or herbicides has occurred within the project area. There were numerous waste rock piles from abandoned mines scattered throughout the site. Depending on the type of ore mined, these waste piles may contain limited concentrations of naturally occurring metals that may not be an environmental concern.

No pole- or pad-mounted transformers were observed that would indicate polychlorinated biphenyls (PCBs) within the boundaries of the project area.

Although no solid waste is produced within the project area, pockets of debris were observed that appeared to have originated from mining activity. Solid waste observed in the project area included construction waste, automobiles and automobile parts, and domestic debris, but not to the extent of being an environmental concern.

No evidence of pits, sumps, or drywells was observed in the project area during the reconnaissance.

No evidence of on-site underground storage tanks was observed in the project area. Two radio tower/ microwave sites were located on the northeastern (approximately 1 mi northeast of Wilson Pass) and south central (Table Mountain) areas of the site. Both of these sites had aboveground fuel storage tanks for emergency power generators. Visual inspection of the tanks and the soil surrounding the tanks did not reveal any evidence of leaking fuel from the tanks.

The conclusions of the Phase I Hazardous Materials Environmental Site Assessment is that there was no evidence of hazardous materials or past spills in the area of the Proposed Action or alternatives.

3.15 Socioeconomics

The geographic area of consideration for socioeconomic analysis is south-central Clark County, Nevada. Communities in Clark County included in the analysis are the Las Vegas metro area, Jean, Goodsprings, and Sandy Valley. The Las Vegas Metropolitan Statistical Area (LVMSA) (Las Vegas, NV–AZ) is included in the analysis to give a regional perspective. These communities were selected because they are either in close proximity to the project area, because they could provide employees or housing for the proposed project, or because they would be impacted adversely or beneficially by the proposed project.

Within the project area, there are no homes and very little development of any kind. The only forms of development are radio/communication towers located on Table Mountain and Potosi Mountain, a utility corridor that traverses the project area, various mining claims that are interspersed throughout the area, and a network of gravel roads that provide access for mining, recreation, and communication facilities. SH 161 is a two-lane undivided highway that runs from I-15 at Jean, west to Goodsprings. From Goodsprings, SH 161 becomes Sandy Valley Road (Clark County), which runs through the project area (in a valley pass) between Table Mountain and Shenandoah Peak and west to Sandy Valley. Because development is almost completely

The Phase I analysis [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

The [illegible]

3.10 Socioeconomics

The [illegible]

[illegible]

lacking within the project area, the main focus of this analysis relates to the socioeconomics of the surrounding communities that are most likely to be affected by implementation of the Proposed Action or alternatives.

Research for this section was conducted primarily through the research of government data and information available through the Internet, telephone conversations with government personnel, and a land use survey of the project area and surrounding communities conducted on April 16 and 18, 2001.

3.15.1 Employment

Tables 3-14 and 3-15 (p. 3-66) show employment and earnings by industry for Clark County. The largest employment sectors (nongovernmental sectors) in Clark County in terms of the number of employees and the number of establishments are services, retail trade, construction, and finance/insurance/real estate. Also, federal, state and local governments are important employers in the area, and important components of the local economy.

The service industry is dominated by the gaming/hotel industry, which is the single-largest attraction for tourists to the Las Vegas Metro area. In 2000, there were 35.8 million visitors to the Las Vegas metro area, and there was approximately $7.6 billion in gross gaming revenue generated (UNLV 2001a).

The LVMSA has experienced steady job growth since the 1980s, reflecting general economic expansion throughout the United States. From 1980 to 1990, employment increased from 215,911 to 375,142, which corresponds to a 73.7% increase in the number of jobs. From 1990 to 2000, employment increased from 375,142 to 707,869, or an 88.7% increase in the number of jobs (UNLV 2001b). For the period of 1980 to 2000, the average annual increase in the number of jobs was 8.1%.

The largest industries in Clark County in terms of annual payroll in 1993 and 1997 were services, retail trade, construction, and finance/insurance/real estate, respectively. The total annual payroll in Clark County was $8,629,130,000 in 1993 and was $13,508,954,000 in 1997.

The ten largest employers in Clark County in 1999 were as follows (number of employees provided parenthetically): Clark County School District (24,150), Nellis Air Force Base (10,050), Bellagio Hotel & Casino (8,950), MGM Grand Hotel (8,450), Bally's & Paris Casino Hotel (8,450), Clark County (7,750), Mirage Hotel & Casino (6,850), Mandalay Bay Resort Casino (5,150), Rio Suite Hotel & Casino (4,950), Caesar's Palace Hotel & Casino (4,850) (Clark County 2001a). Clearly, the largest employers in the County are the Gaming/Hotel Resorts.

In November 2001 the unemployment rate for the LVMSA was 6.7%, up from 5.0% prior to September 11, 2001. Peak unemployment in Nevada and in Clark County occurred in 1984 when unemployment was at 11.9 and 12.1%, respectively (UNR 2001).

According to BLM Las Vegas Field Office geologists, active mining operations located on BLM-administered lands in Clark County have yielded very low production levels in the last 30 years, with the exception of sand, gravel, and silt. Sand, gravel, and silt mined from public lands in Clark County provide important economic material in support of the booming construction industry. However, because the demand for these mineral resources from the construction industry has been so high, these mining operations have conflicted both economically and environmentally with air quality and aesthetics (BLM 1998).

[illegible]

[illegible]

2.15.1 Employment

Tables 2.14 and 2.15 [illegible] Clark County. [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Table 3-14. Employment in Clark County, Nevada.

	1993		1997	
Industry Sector	**Number of Employees**	**Number of Establishments**	**Number of Employees**	**Number of Establishments**
Services	210,437	7,257	274,313	9,482
Retail trade	69,803	4,588	94,369	5,713
Construction	29,524	1,832	56,591	2,389
Finance, insurance, and real estate	20,031	2,185	29,030	3,282
Transportation and public utilities	18,958	724	25,892	938
Wholesale trade	13,652	1,212	19,746	1,551
Manufacturing	11,981	635	18,315	837
Agricultural services, forestry, and fishing	2,217	351	4,451	480
Mining	295	33	786	53
Unclassified establishments	215	169	144	288
Total	377,113	18,986	523,637	25,013

Source: U.S. Census Bureau 1993, 1997.

Table 3-15. Earnings by Industry in Clark County, Nevada.

Industry Sector	**1993 Annual Payroll ($1,000)**	**1997 Annual Payroll ($1,000)**
Services	4,729,037	7,032,619
Retail trade	1,036,184	1,626,492
Construction	921,186	1,767,408
Finance, insurance, and real estate	580,009	931,305
Transportation and public utilities	575,557	777,892
Wholesale trade	391,793	640,629
Manufacturing	343,171	604,797
Agricultural services, forestry, and fishing	38,729	87,619
Mining	9,639	32,373
Unclassified establishments	3,825	7,820
Total	8,629,130	13,508,954

Source: U.S. Census Bureau 1993, 1997.

3.15.2 Population

Population estimates, historical data, and projections are presented in Tables 3-16, 3-17, and 3-18 (p. 3-68). Clark County, Nevada, was the fastest growing county in the United States during the 1990s. Clark County's population increased from 463,087 in 1980 to 741,459 in 1990, which corresponds to a 60.1% increase. In 2000, the county's population was 1,375,765, or an 85.5% increase from 1990 to 2000. The state of Nevada's population increased by 50.1% from 1980 to 1990 and by 66.3% from 1990 to 2000. However, the state's high population increases reflect the fact that Clark County's population makes up most of the state's population, about 69% in 2000. Clark County's population during the 1980s and 1990s far outpaced the national average for these decades, which was 9.8% during the 1980s and 13.2% during the 1990s (U.S. Census Bureau 1990, 1995, 2000).

The primary cause of the recent population surge is increased economic opportunity in the Las Vegas metro area. Construction continues to employ a very large workforce, and hotel and casino employment continues to grow. In addition, many of the new residents come to retire in the Las Vegas metro area (UNLV 2001b).

The Las Vegas Metro area includes all of Clark County and the westernmost portion of Mohave County, Arizona. Major cities in these areas include Las Vegas, North Las Vegas, and Henderson. These cities are the most populous cities in Clark County and have grown tremendously from 1990 to 2000. Las Vegas had a population of 258,295 in 1990 and 484,454 in 2000, which corresponds to an 87.6% increase for the decade. North Las Vegas had a population of 47,707 in 1990 and 125,196 in 2000, or a 162.4% increase for the decade. Henderson was the fastest growing city in the country during the 1990s. It had a population of 64,942 in 1990 and 199,104 in 2000, or a 206.6% increase during the decade (U.S. Census Bureau 1990, 2000).

Immediately adjacent to the project area are the communities of Goodsprings, Sandy Valley, and Jean. Goodsprings is located approximately 1 mi east of the project area, and the 2000 population is estimated at 208. Sandy Valley is located approximately 6 mi west of the project site, and the 2000 population is estimated at 1,508. Jean is an unincorporated area located at the intersection of I-15 and SH 161, but there is no housing in this area, and the only permanent population is that of the Southern Nevada Correctional Facility, with a population of 600 (Clark County 2000).

3.15.3 Housing

Housing in Clark County, Nevada, is concentrated almost entirely in the Las Vegas metro area, in the cities of Las Vegas, North Las Vegas, and Henderson and the unincorporated areas of Paradise, Spring Valley, and Winchester. The cities of Boulder City and Laughlin provide additional housing within the county. These cities have experienced an extraordinary housing boom during the 1990s, driven by relatively low interest rates, a rapidly expanding job market, the area's warm climate, and close proximity to other major cities in California. In Clark County, the number of new homes bought in 2000 was 20,508. Vacancy rates for single-family units in Clark County in 2000 were 2.04%, and there was an average vacancy rate of 4.03% for all housing types (Clark County 2001c). The median price of a new home in January 2001 was $160,432 and was $147,800 in January 2000. The median monthly rent for an apartment in Clark County was $706 in 2001 (UNLV 2001b).

In Sandy Valley, homes vary from manufactured homes and recreational vehicles (RVs) to custom-built single-family homes and ranchettes built on relatively large lots. Home prices vary from about $45,000 to $300,000. Median rental prices for 3-bedroom, 2-bath single-family homes are about $650. There are about 12 homes listed for sale at any given time in Sandy Valley (Gonzalez 2001).

In Goodsprings, there are far fewer homes available, more trailers, and fewer custom-built homes than in Sandy Valley. Home prices vary from about $55,000 to $150,000. Median rental prices for 3-bedroom, 2-bath

3.13.2 Population

[illegible] (U.S. Census Bureau 1990, 1997, 2000).

The primary reason of the [illegible]

The Las Vegas Metropolitan [illegible]

Immediately adjacent to [illegible]

3.13.3 Housing

Housing in Clark County [illegible]

In Sandy Valley [illegible]

In Goodsprings [illegible]

Table 3-16. Populations of Area Communities, ca. 2000.

Locale	Population
Clark County[a]	1,375,765
Las Vegas MSA[b]	808,754
Goodsprings[b]	208
Sandy Valley[b]	1,508
Jean[b]	600
State of Nevada[a]	1,998,257

a. U.S. Census Bureau 2000.

b. Clark County 2000.

Table 3-17. Historical Population Data.

Population					
Locale	**1980[a]**	**1990[a]**	Percentage Change 1980–1990	**2000[b]**	Percentage Change 1990–2000
Clark County	463,087	741,459	60.1	1,375,765	85.5
Las Vegas MSA	Not available	808,754	Not available	852,646	
State of Nevada	800,493	1,201,833	50.1	1,998,257	66.3
United States	226,542,199	281,421,906	9.8	281,421,906	13.2

a. Clark County 2001.

b. U.S. Census Bureau 1990, 1995, 2000.

Table 3-18. Populations Projections.

	Population			
Locale	**2001**	**2005**	**2010**	**2015**
Clark County	1,502,482	1,738,111	1,945,409	2,120,940
State of Nevada	2,148,132	2,402,097	2,611,453	2,950,942

Source: Clark County (2001b).

single-family homes are about $650. There are rarely more then 3 homes listed each year, and the homes that are listed typically are sold relatively quickly (Gonzalez 2001).

3.15.4 Schools

Clark County has only one school district, the Clark County School District, which is currently ranked as the tenth largest school district in the country. This school district includes 194 schools, comprising 136 elementary schools, 27 middle schools, 24 high schools, and 7 special-purpose schools. Some elementary and middle schools are on a year-round schedule. The district is ranked as one of the fastest-growing school districts in the country; over the past 6 years, 72 new schools have been opened to accommodate an average annual growth rate of just over 7%. The 1997 enrollment in grades K–12 was 179,106, representing a 7.4% increase over 1996 (Relocation Central.com 2001).

The sole school in Goodsprings is the Goodsprings Elementary School, which currently has 7 students enrolled and had 21 students enrolled last year. This school serves the communities of Goodsprings, Jean, and Primm; however, there are currently no students from either Jean or Primm. During the 2000–2001 school year, there were approximately 5 middle school students from Goodsprings, and they all attended Sandy Valley Middle School. During the 2000–2001 school year, there were approximately 7 high school students, and they all attended Durango High School, located in Las Vegas (Johnson 2001).

Sandy Valley has two schools: the Sandy Valley Elementary/Middle School and the Keystone Academy Charter School (high school). During the 2000–2001 school year, the Sandy Valley Elementary/Middle School had a total enrollment of 258 students, including 171 elementary students and 87 middle school students (Sandy Valley Elementary/Middle School 2001). This school serves students living in Goodsprings, Sandy Valley, and Mesquite Valley, California (Inyo and San Bernardino Counties). In 2001, approximately 30 of the students came from Mesquite Valley. The Keystone Academy Charter School had a total enrollment of 51 students during the 2000–2001 school year, and is expected to grow to 75 to 125 students by the year 2004. This school serves students of Mesquite Valley, California, and Sandy Valley and Goodsprings, Nevada (Siekerman 2001). Currently, most high school-aged students living in Sandy Valley attend high school at Durango High School in Las Vegas (Sandy Valley Elementary/Middle School 2001).

Currently, buses are used by Goodsprings Elementary School (as needed), the Sandy Valley Elementary/ Middle School, and high school students living in Sandy Valley or Goodsprings who attend Durango High School. Buses serving Goodsprings Elementary School use SH 161 (when there are students living in these areas) to transport students living along the I-15 corridor from Jean south to the California border (including Primm). Buses serving the Sandy Valley Elementary/Middle School use SH 161 to shuttle students from Goodsprings to Sandy Valley (to the middle school). Also, Clark County buses transport students from Sandy Valley and Goodsprings, along SH 161 and I-15, to Durango High School in Las Vegas. Next year, buses would use the same route to transport these students to Sierra Vista High School in Las Vegas.

3.15.5 Government Taxation and Revenue

In Clark County, Nevada, the sales and use tax is 7.25%. This 7.25% tax is several taxes combined, based on Nevada's Statutes. All counties in Nevada charge the following taxes: Sales Tax—General Fund (2.00%), Local School Support Tax (2.25%), Basic City Council Relief Tax (0.50%), and Supplemental City-County Relief Tax (1.75%). Clark County charges the following additional taxes: Public Mass Transportation & Construction of Roads (0.25%), Control of Floods (0.25%), and Infrastructure (0.25%). Sales tax is charged at retail on the sale of tangible personal property unless exempt by statute. There is no sales tax on food items used for home consumption or prescribed medical goods (Nevada Department of Taxation 2001).

single family homes as about 60%, however many [illegible]
are listed typically are well [illegible] quality [illegible] 2007).

4.15.6 Schools

Clark County School District (CCSD) [illegible] Nevada [illegible] the [illegible] largest school district in the country. [illegible] elementary schools, 17 middle schools, 34 high schools, [illegible] middle schools and [illegible] alternative schools. The [illegible] district in the country [illegible] school growth rate of [illegible] between over 1995 [illegible] (2005).

The only school in [illegible] had 21 students [illegible] Primm, however, [illegible] year, there were approximately [illegible] Valley Middle School [illegible] and [illegible] 50 students [illegible] High School [illegible] (2005).

Sandy Valley [illegible] County School [illegible] Sandy Valley [illegible] School had [illegible] Sandy Valley, and [illegible] 50 of the students came from [illegible] of 31 students during the 2003–2004 school year [illegible] 2004. [illegible] Goodsprings 2005). Currently, [illegible] Durango High School in Las Vegas [illegible]

Currently, buses are used to [illegible] Sandy Valley [illegible] middle school, and high school students [illegible] School, buses serving Goodsprings elementary school [illegible] primm [illegible] Goodsprings to Sandy Valley [illegible] Valley and Goodsprings [illegible] buses and the [illegible]

4.15.7 Government Taxation and Revenue

In Clark County, Nevada, the [illegible] Property Taxation [illegible] Local School Support Tax (LSST) [illegible] Motor Tax [illegible] Clark County [illegible] Construction of Roads [illegible] result in the sale of tangible personal property [illegible] use or home consumption of [illegible]

Gasoline is taxed at 23 cents per gal. There is also a motor vehicle tax where the valuation of the vehicle is determined at 35% of the manufacturer's suggested retail price, without accessories. Vehicle value is depreciated to 85% after the first year and graduated down to 5% after 9 years. There are five principle types of gaming taxes. Gross gaming revenue tax, taxable tax, and slot taxes are levied by the state. The counties levy the county table tax. There are no corporate or personal income taxes in Nevada (Relocation Central.com 2001).

Nevada's constitutional limit on property tax is $5 per $100 of assessed valuation while the statutory limit is $3.64 per $100. Assessment is at 35% of taxable value, and the tax rate is applied to the assessed value. The tax rate for 2000–2001 in the City of Las Vegas is $3.1681 per hundred dollars of assessed value (Hartig 2001). The taxable value for real property (land) is full cash value. The Assessor is required by Nevada law to physically reappraise all property at least once every 5 years (Relocation Central.com 2001).

The project area and the community of Goodsprings are located in Clark County Tax District 100 (Unincorporated County), and the 2000–2001 tax rate is $2.4734 per $100 of valuation. The community of Jean is located in Tax District 104 (Unincorporated County Fire LVMPD), and the 2000–2001 tax rate is $2.6891 per $100 valuation. The community of Sandy Valley is located in Tax District 103 (Unincorporated County 911), and the 2000–2001 tax rate is $2.4784 per $100 valuation (Hartig 2001).

3.15.6 Community Characteristics, Facilities, and Infrastructure

The community of Goodsprings is closest to the proposed WGF site at approximately 1 mi to the east. Goodsprings is a very small community that was settled during the 1850s as a mining and ranching community. Today the ranching and mining history is part of Goodsprings identity, and the area surrounding the town is recognized by the state of Nevada as historical mining district. Some of the Goodsprings residents still work in the local mining industry. There are few signs of any active ranching in the area. Goodsprings has approximately 90 households, the Pioneer Saloon, the Desert Treasures gift shop, the Goodsprings Elementary School (Clark Independent School District), and the Goodsprings Branch Library (Las Vegas–Clark County Library District). Real estate and other forms of home-based businesses are other forms of local income. Most residents of Goodsprings find work in other communities, such as the Las Vegas metro area, and to a lesser extent Jean, Sloan, Primm, and Sandy Valley. Nevada Power provides electricity. Water is obtained from wells, and septic systems are used for sewage disposal.

The community of Jean is located along I-15 about 6 mi from the project area, at the intersection of SH 161. This community that has no homes or permanent residents relies heavily on travelers along I-15 as a major source of income, who stop at its two large, prominently located casino/hotels. The Nevada Landing Hotel and Casino features 300 hotel rooms, 35,000 ft^2 of casino, and a restaurant and employs approximately 550 people, of which about 20% are from Sandy Valley and Goodsprings and the other 80% come from the Las Vegas metro area. The Gold Strike Hotel and Gambling Hall features 812 hotel rooms, 37,000 ft^2 of casino, and a restaurant and employs approximately 650 people, of which about 20% are from Sandy Valley and Goodsprings and the other 80% come from the Las Vegas metro area (Goslar 2001). Other facilities that are located in Jean include two small gas station/minimarts, a Nevada Welcome Center, the Jean Airport (Clark County Dept. of Aviation), the Southern Nevada Correctional Center, a U.S. Post Office, and the Letica Corporation (manufacturing). There are no permanent residents of Jean (besides the prison population), so Jean's entire workforce comes from surrounding communities. Nevada Power provides electricity for the community of Jean. Water is obtained from wells, and septic systems are used for sewage disposal. No solid waste disposal services are available. However, the two casinos, which have common ownership, share a well and a private wastewater treatment plant (Goslar 2001).

The community of Sandy Valley is located about 6 mi west of the project area, along Sandy Valley Road. This community is relatively spread out, with a combination of large-lot custom homes, ranchettes, Overton is located [illegible]. There is also a [illegible] [illegible] [illegible] 2001).

[illegible] Clark County [illegible] [illegible] City of Las Vegas [illegible] 2001). [illegible]

The project area and the community of Goodsprings are located in Clark County. [illegible]

4.10.4 Community Characteristics, Facilities, and Infrastructure

The community of Goodsprings is located [illegible] Goodsprings [illegible]

The community of Jean is located along I-15 [illegible]

The community of Sandy Valley is located [illegible] manufactured homes, farms, a few businesses, and a few community facilities. Farming and mining provide some local employment opportunities, but most residents of this area work in Jean, Pahrump, and the Las Vegas metro area (Peplowski 2001). Employers within Sandy Valley include the Sandy Valley Elementary/Middle School, the Keystone Academy Charter School, the Sandy Valley Library, two bars, a general store, two restaurants, a small private airport, and a couple of small manufacturing (agricultural products) facilities. This agricultural valley also extends into the Mesquite Valley of California, located in San Bernardino and Inyo counties. Major crops grown in this area include hay and sod. At least some of Sandy Valley's population works at various mining operations within the area. However, most employment opportunities for Sandy Valley residents are located in the Las Vegas Metro area and, to a much lesser extent, in Jean, Sloan, and Primm (Johnson 2001). Electricity is provided by the VEA co-op. Water is obtained from wells, and septic systems are used for sewage disposal.

There are small airports located in the towns of Jean and Sandy Valley. The Jean airport is owned by Clark County and provides service for small, privately owned aircraft and gliders. The Sandy Valley Airport is privately owned and provides service to small aircraft. The Clark County Department of Aviation has plans to build the Ivanpah Airport, 3 mi south of Jean, which would provide domestic and international commercial airline service and take pressure off the increasingly congested McCarran International Airport, located in Las Vegas. Preparation of the EIS for this project is expected to begin in 2004, with the completion of airport construction by 2008. This airport is expected to make commercial and residential development along the I-15 corridor south of Las Vegas more attractive in the near future (Sinagra 2001).

3.16 Environmental Justice

Executive Order 12948, Federal Actions to Address Environmental Justice (EJ) in Minority Populations and Low-Income Populations, requires that federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects that impact low-income and minority populations as a result of federal programs, policies, or activities. Demographic analysis is the first step in this determination. Such analysis includes defining the region of influence, census block groups, low-income populations, minority communities, and the thresholds for calculating a low-income or minority community census block group.

For analytic purposes, low-income populations are defined as individuals living within a census tract or block group whose income are below the poverty level. Households are classified as being below the poverty level if the total family income or unrelated individual income is less than the poverty threshold specified for the applicable family size.

For the purposes of the proposed project, EJ analysis has been conducted for the census tract where temporary construction-related impacts would be experienced: Clark County census tract 58.98. This census tract covers unincorporated areas of southern Clark County including the following communities (approximate year 2000 populations provided parenthetically for each): Blue Diamond (290), Mountain Springs (99), Sloan (169), Jean (600 [prison population]), Sandy Valley (1,508), Goodsprings (208), Primm (260), Nelson (61), Searchlight (769), and Cal-Nev-Ari (216) (Clark County 2000). The total population for this census tract in 1990 was 5,995 (U.S. Census Bureau 1990).

Clark County Census Tract 58.98 covers a large, sparsely populated area (approximately 40% of Clark County) that includes numerous small communities. Since no block group level data is available for these communities, the census tract level data was used in this analysis.

Table 3-19 (p. 3-72) compares the ethnic profile, percentage of population living below the poverty level, and median household incomes for Census Tract 58.98, Clark County, and the state of Nevada. This profile shows that generally (in 1990) the population living in these unincorporated areas of the county was slightly less ethnically diverse, had a smaller percentage of the population living below the poverty line, and a larger

median household income than both Clark County and the state of Nevada. The only exception is that Census Tract 58.98 had a slightly higher percentage of African-Americans than for Clark County and a substantially higher percentage than that of Nevada.

Despite a proportion of African-Americans living in Census Tract 58.98 that is slightly higher than Clark County overall, and substantially higher than Nevada, it is not anticipated that the proposed project would cause a substantial adverse impact to any of the population living in the communities of Jean, Goodsprings, or Sandy Valley. No other substantial minority or economically disadvantaged populations live in the vicinity of the Proposed Action or have been identified as likely to experience disproportionately high and adverse human health or environmental effects as a result of the proposed project.

Table 3-19. Population Ethnicity Profile and Poverty Status for 1990.

	Locale		
	Clark County Census Tract 58.98	**Clark County**	**Nevada**
Total Population	5,995	741,459	1,201,833
Number of Caucasians	4,970	559,628	947,480
(Percentage of Caucasians)	(78.9)	(75.5)	(78.8)
Number of African-Americans	619	69,200	76,795
(Percentage of African-Americans)	(10.1)	(9.3)	(6.4)
Number of Hispanics	503	80,704	121,346
(Percentage of Hispanics)	(8.4)	(10.9)	(10.1)
Number of other	155	31,927	56,212
(Percentage of other)	(2.6)	(4.3)	(4.7)
Number of poverty status	399	76,737	119,660
(Percentage of poverty status [1989])	(6.7)	(10.3)	(10.0)
Median household income (1989)	$33,797	$30,746	$31,011

4.0 ENVIRONMENTAL CONSEQUENCES

Environmental consequences of construction, operation, and maintenance of the proposed WGF are discussed below for each potentially affected resource under each alternative. A discussion of impacts that can be reasonably expected from project implementation is included.

Potential impacts resulting from implementation of the project alternatives that are both potentially adverse and beneficial are evaluated and presented. The environmental consequences discussion addresses the potential temporary impacts resulting from construction activities and the long-term impacts from operation of a proposed WGF and ancillary facilities. The Proposed Action, two alternatives, (Alternative A and Alternative B), and a No-Action Alternative are analyzed for this project. The alternatives do not represent a change in the WGF sites or operation, but represent a change in the total number of WTGs by model (NEG Micon 900, NEG Micon 1500). For each alternative, the WTGs would be located on undeveloped land within the Table Mountain Wind Generating Facility project area. Physical characteristics of the locations of the Proposed Action and Alternatives A and B are similar; therefore, the impact assessment of the alternatives on many resources evaluated in this EIS is also similar.

An environmental consequence or impact is defined as a modification of the existing environment brought about by development activities. Impacts can be beneficial or adverse, can be a primary result of the action (direct), or a secondary result (indirect), and can be permanent or long-lasting (long-term) or temporary and of short duration (short-term). Impacts can vary in degree from only slightly discernible to a total change in the environment.

Short-term impacts are effects on the environment that occur during and immediately after the conclusion of construction and final testing. For this project, short-term impacts are defined as lasting 5 years or less. Long-term impacts are changes made in the environment during construction and operation of the project that remain for the LOP or after final reclamation has been completed.

Potential impacts for this project were classified into five levels: significant, moderate, negligible, no impact, and beneficial. Significant impacts (as defined in CEQ guidelines 40 CFR 1500–1508) are effects that are the most substantial and, therefore, should receive the greatest attention in decision-making. Impact significance criteria are given for those affected resources where significance criteria can be reasonably supported (i.e., by scientific or regulatory considerations). Moderate impacts do not meet the criteria to be classified as significant, but nevertheless result in a degree of change that is easy to detect. Moderate impacts have the potential to become significant if not adequately mitigated. Negligible impacts cause little or no effect to the existing environment and cannot be easily detected. No impact would result in no change to the existing environment. Beneficial impacts are those that provide desirable situations or outcomes.

Cumulative impacts are those that result from the incremental impacts of the proposed project added to past, present, and reasonably foreseeable future actions. The area considered for cumulative impacts varies depending on the resource being analyzed, but includes, at a minimum, the entire Table Mountain Wind Generating Facility project area. Cumulative impacts are described for each resource. For many resources and socioeconomic impacts, the cumulative impact analyses included areas located outside the project area.

Under the No-Action Alternative, the proposed WGF and ancillary facility would not be built. This alternative would essentially maintain the existing condition of the environment within the project area. No immediate impact on the existing environment would occur because no additional ground would be disturbed. The No-Action Alternative is not expected to result in direct development of another energy source within the project area or the surrounding area.

4.0 ENVIRONMENTAL CONSEQUENCES

Impacts of the Proposed Action, Alternative A, Alternative B, and the No-Action Alternative are discussed in detail in the following sections.

4.1 Geology, Seismicity, Soils, and Mining

For the purposes of this EIS, impacts on geology and soils would be significant if they resulted in the following:

- Substantial erosion and siltation
- Exposure of people or structures to major geologic hazards (including earthquakes, ground failure, or similar hazards)
- Conflict with established mining claims and/or mineral rights in the area
- Substantial reduction or loss of unique or special mineral potential.

4.1.1 Proposed Action

4.1.1.1 Impacts on Geology and Soils

There are no unique or special geologic or soil resources at the project site to be affected by the Proposed Action. Therefore, impacts on geologic conditions would not be significant. However, bedrock is exposed or shallow in some areas of the site, which may cause some difficulties during grading, site preparation, excavation, and trenching.

Soils would be disturbed, mixed structurally, compacted, and exposed to erosion during construction, possibly resulting in a temporary increase in erosion and windblown dust on approximately 754 ac until construction is completed. With implementation of proper mitigation measures, these impacts would not be significant. No known geologic or soil conditions would negatively impact construction or operation of the WGF if appropriate engineering standards are followed. Other potentially adverse conditions that could affect the Proposed Action include soil compaction, corrosivity, and susceptibility to erosion; however, with implementation of proper engineering designs and construction materials, impacts would not be significant.

4.1.1.2 Impacts on Faults and Seismicity

Numerous faults are present in the vicinity of the proposed WGF site. However, the risk of seismically induced strong ground shaking is relatively low. Implementation of current design practices, which require facilities to be built to Seismic Zone 4 standards, would further reduce the risk of impacts from earthquakes. Therefore, impacts from major geologic hazards would not be significant.

4.1.1.3 Impacts on Minerals and Mining

Although no economic or unique mineral deposits have been identified at the proposed site of the WGF, there are numerous active and closed mining claims in the area. The Proposed Action would result in access roads crossing three patented mining claims. None of these claims were patented prior to 1955. Numerous unpatented mining claims occur within the area encompassing the Proposed Action; however, none of the WGFs would be sited in an area that would interfere with present or future mining activities. The Proposed Action would not result in restricted access to any mining claim during construction or during the LOP. Access and service roads in the project area will remain open for access to mining claims.

4.1.2 Alternative A

The impacts on geologic, seismic, soils, and mining resources under Alternative A would be similar to the impacts associated with the Proposed Action. This alternative would result in construction of 34 additional WTGs and a 0.5-ac increase in permanent land disturbance. This impact would be considered negligible over the LOP with the implementation of adequate mitigation measures.

4.1.3 Alternative B

The impacts on geologic, seismic, soils, and mining resources under Alternative B would be similar to the impacts associated with the Proposed Action, except for a 0.3 ac decrease in the amount of land permanently disturbed for WTGs. This decrease in land disturbance would be considered a negligible beneficial impact over the LOP.

4.1.4 No-Action Alternative

Under the No-Action Alternative, there would be no approval of ROW applications and the proposed project would not be built. Therefore, there would be no impacts related to geology, seismicity, soils, and mining resources.

4.2 Surface Water Hydrology

For the purposes of this EIS, impacts on surface water hydrology would be significant if they resulted in the following:

- Exposure of people and property to substantial flooding and/or substantial degradation of water quality
- Substantial erosion, scour, or siltation
- Alteration of existing drainages in a manner that could substantially and negatively affect listed and/or sensitive species or associated habitat.

4.2.1 Proposed Action

4.2.1.1 Impacts on Flooding

The Proposed Action would not result in increased flooding or flood-related hazards. The proposed WGF site is not located within the 100-year floodplain as determined by FEMA (1995a, 1995b, 1995c). Because the proposed WGF would not be located within 100-year floodplain, flooding impacts would be insignificant.

Ancillary improvements associated with the proposed WGF (such as the distribution lines, substation, and access road) are not located within the 100-year floodplain or the 500-year floodplain of any waterway, according to FEMA (1995a, 1995b, 1995c). Temporary flooding could occur along various segments of the access roads at wash crossings; however, short-term flooding of washes is typical of the desert environment and is not viewed as a significant impact.

4.2.1.2 Impacts on Runoff

The proposed WGF would have minimal impacts on the downstream watercourses with respect to increasing the volume of runoff and peak flow rates and increasing siltation. The location of the WGF and ancillary facilities would not substantially alter any existing drainages; therefore, the Proposed Action would not result in significant impacts on runoff. Due to the relatively small area of impact that would result from the ancillary

improvements of the Proposed Action, these elements would also not result in a significant impact on runoff with the incorporation of Best Management Practices (BMPs).

4.2.1.3 Impacts on Water Quality

Development of the Proposed Action is unlikely to cause significant impacts on the quality of surface water or a reduction in purity or clarity. BMPs would be implemented during construction to minimize impacts on surface water quality. Operation and maintenance of the proposed WGF would not result in a significant impact on water quality.

4.2.1.4 Impacts on Wetlands

No direct impacts on wetlands would occur from the construction or maintenance of the Proposed Action.

4.2.2 Alternative A

The impacts on surface water hydrology under Alternative A would be slightly greater than the impacts associated with the Proposed Action. This alternative would result in a 22% increase in the number of WTGs constructed. This increase would result in more ground disturbance and an increased potential for impacts on water quality. Implementation of BMPs will minimize potential impacts. Impacts on surface water would be significant under this alternative.

4.2.3 Alternative B

The impacts on surface water hydrology under Alternative B would be less than the impacts associated with the Proposed Action, since this alternative represents a 12% decrease in the number of WTGs. With the implementation of BMPs, impacts on surface water would not be considered significant.

4.2.4 No-Action Alternative

Under the No-Action Alternative, there would be no approval of ROW applications and the proposed WGF would not be built. Therefore, there would be no impacts related to surface water hydrology.

4.3 Groundwater Resources

For the purposes of this EIS, impacts on groundwater resources would be significant if they resulted in the following:

- A substantial decrease in groundwater quality
- A substantial drawdown to groundwater levels in the basin resulting in a reduction of discharge at springs
- A substantial decrease in groundwater resources available to others.

4.3.1 Proposed Action

4.3.1.1 Impacts on Basin-Fill Aquifers

The water table in the carbonate strata is approximately 5,500 ft below land surface at the proposed WGF site. Consequently, it is unlikely that WGF construction or operation would adversely affect groundwater conditions or groundwater quality in basin-fill aquifers. Therefore, the Proposed Action would not significantly impact the basin-fill aquifer.

4.3.1.2 Impacts on Carbonate-Rock Groundwater Flow Systems

Groundwater withdrawal or pumping would not be a part of the construction or operation of the Proposed Action; therefore, the proposed action would not impact groundwater quantities or groundwater quality.

4.3.2 Alternative A

The impacts on groundwater resources under Alternative A would be the same as the impacts associated with the Proposed Action.

4.3.3 Alternative B

The impacts on groundwater resources under Alternative B would be the same as the impacts associated with the Proposed Action.

4.3.4 No-Action Alternative

Under the No-Action Alternative, there would be no issuance of ROW grants and the proposed project would not be built. Therefore, there would be no impacts related to groundwater resources.

4.4 Paleontological Resources

For the purposes of this EIS, impacts on paleontological resources would be significant if:

- They would disrupt or adversely affect a paleontological site within the project area except as part of an approved scientific study
- They would disrupt or adversely affect a paleontological site outside of and/or adjacent to the project area except as a part of an approved scientific study.

4.4.1 Proposed Action

Fossil-bearing lithologic units are present and may be impacted by development of the WGF. The Goodsprings Dolomite, Sultan Limestone, Monte Cristo Limestone, and Bird Springs lithologic units have undetermined (or high, if Pleistocene cave deposits are encountered) paleontologic sensitivity. The volcanics and alluvium have low paleontologic sensitivity. However, the alluvium at the surface throughout the proposed WGF site may be underlain by fossil-bearing rock units. Excavation in the younger alluvium may expose paleontologically sensitive sediments.

Construction activities could result in the destruction or loss of potentially fossiliferous units. More recent alluvium with low fossil potential would also be disturbed, but this material may overlay more fossil-rich deposits.

Woodrat middens and Pleistocene cave deposits could also be lost or disturbed by construction activities.

The scientific value of fossils is in the information that they contain rather than in the fossilized materials themselves; therefore, proper mitigation measures would reduce impacts on paleontological resources and would not result in a significant impact.

4.4.2 Alternative A

The impacts on paleontological resources under Alternative A would be slightly greater than the impacts associated with the Proposed Action since this alternative includes the construction of 34 additional WTGs. Implementation of mitigation measures would reduce potential impacts on a level that would not be significant.

4.4.3 Alternative B

The impacts on paleontological resources under Alternative B would be slightly less than the impacts associated with the Proposed Action. This alternative will include 18 fewer WTGs, thereby reducing the potential to impact paleontologic resources. With implementation of appropriate mitigation measures, impacts under this alternative would not be significant.

4.4.4 No-Action Alternative

Under the No-Action Alternative, there would be no approval of ROW applications and the proposed project would not be built. There would be no impacts related to paleontological resources.

4.5 Biological Resources

For the purposes of this EIS, impacts on biological resources would be considered significant if they resulted in the following:

- Substantial reduction or diminishment of habitat for fish, wildlife, or plants
- Cause a plant or wildlife population to drop below self-sustaining levels
- Introduction of noxious weeds into a previously uninfested area, or a substantial increase of an existing noxious weed population
- Elimination of a plant or animal community
- Violate the Endangered Species Act (ESA), the Bald Eagle Protection Act (BEPA), MBTA, or Nevada State Law
- A decline in raptor or migratory bird populations
- Substantial interference with the movement of any resident or migratory fish or wildlife species
- Conflict with management strategies for Horse and Burro Management Areas.

4.5.1 Proposed Action

4.5.1.1 Impacts on Vegetation

Direct impacts (crushing, possible contamination, "scalping," removal) on vegetation would include losses due to temporary construction and permanent habitat loss associated with the operation and maintenance of the proposed facility. The temporary losses to the existing vegetation would occur during the construction of the WTGs, underground collection lines, and new access roads, and while improvements are made to existing roads. Permanent impacts would result from loss of vegetation at the WTG locations, substation, and from the

4.4.2 Alternative A

[illegible]

4.4.3 Alternative B

[illegible]

4.4.4 No Action Alternative

[illegible]

4.5 Biological Resources

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

4.5.1 Proposed Action

4.5.1.1 Impacts on Vegetation

[illegible]

conversion of undeveloped land into access roads. Most vegetation in the direct footprint of the facilities (tower sites, power pole locations, substation, road driving surface) would be permanently removed.

Temporary Disturbance from Construction Activities. The construction activities associated with the proposed project would result in the temporary disturbance (crushing and scalping of the aboveground parts of the plants) of blackbrush scrub, creosote bush scrub, Mojavean pinyon-juniper woodlands, and Mojave wash scrub plant communities. Estimates for project impacts on these communities are provided in Table 4-1 (p. 4-7). For this analysis, it is assumed that a 200-ft corridor would be disturbed along the length of each WTG string, which would include the WTGs and transformers, meteorological towers, service roads, underground collection lines, and underground communication cables. Access roads would disturb a maximum 60-ft width in flat to moderate terrain. Access roads constructed in steep terrain, such as the approach to Shenandoah Peak, would require a 100-ft-wide temporary construction ROW. Overhead distribution lines would require a 100-ft-wide temporary ROW during construction. The greatest amount of temporary disturbance would be 616.7 ac to the blackbrush scrub community. The least impacted community would be Mojave wash scrub at 3.7 ac.

Impacts on vegetation along electric distribution lines and staging areas would be temporary, allowing vegetation to regenerate following construction. Most vegetation in the footprint of the facilities and in upgraded and new access roads would be permanently removed. Additional impacts on vegetation communities would include soil compaction, loss of topsoil, and removal or reduction in seed bank. Indirect impacts on vegetation at and adjacent to the proposed WGF and ancillary facilities include increased human presence that could lead to unauthorized vehicle use off-road, potential illegal dumping, and illegal collection of plants.

Table 4-1. Temporary Impacts on Existing Vegetation within the Project Area.

	Area of Impact by Plant Community			
Facility Type	Blackbrush Scrub (ac)	Creosote Bush Scrub (ac)	Mojavean Pinyon-Juniper Woodland (ac)	Mojave Wash Scrub (ac)
Wind turbine generator corridor	464.7	0	18.3	0
Wind turbine generator	(2.5)[a]	0	(0.19)	0
Meteorological tower	(0.0014)	0	(0.0001)	0
Underground distribution line	13.3	0	(11.5)	0
Service road	(11.4)	0	(24.6)	0
Access road	42.5	17.1	0	1.4
Overhead distribution line	74.8	83.2	0	2.3
Laydown areas and batch plant	10	5	0	0
Substation	0	10	0	0
Total	616.7	115.3	18.3	3.7

a. Acreages in parentheses are accounted for within the WTG corridor acreage total and are provided for informational purposes only.

The temporary disturbances associated with the project would be adverse but not significant due to the overall abundance of these vegetation communities in the region. The project proponent would reseed the disturbed areas upon completion of construction; however, the very nature of the desert environment precludes rapid establishment of mature plant communities. The project proponent would develop an approved reclamation plan that describes the restoration of disturbed areas. This plan would outline revegetation, soil stabilization, and erosion reduction measures. Implementation, monitoring, and success criteria would be established to ensure the successful reclamation of the project area. The project reclamation plan would be developed concurrently with the EIS process and included as an appendix to the FEIS and would also be included in the POD.

Long-Term Disturbance from Construction Activities. The project would have long-term but not significant impacts on native vegetation in the project area. These impacts are associated with the conversion of undeveloped land into industrial or ancillary transportation land use. These include the construction of the WTGs, underground and aboveground distribution lines, substation, and access and service roads. Table 4-2 (p. 4-8) provides acreages of permanent impacts on vegetation associated with implementation of the Proposed Action. The permanent and long-term conversion of the native vegetation would result in adverse but less than significant impacts due to the overall abundance of these vegetational communities in the region. With implementation of proposed mitigation measures, impacts on plant communities would not be significant.

Threatened, Endangered, and Sensitive Plant Species. No federally listed plant species are known to occur in the area of the Proposed Action. Construction and operation of the proposed WGF and ancillary facilities would have no impact on federally listed endangered or threatened plant species.

Table 4-2. Permanent Impacts on Existing Vegetation within the Project Area.

	Area of Impact by Plant Community			
Facility Type	Blackbrush Scrub (ac)	Creosote Bush Scrub (ac)	Mojavean Pinyon-Juniper Woodland (ac)	Mojave Wash Scrub (ac)
Wind turbine generator corridor	163.5	0	6.5	0
Wind turbine generator	(2.5)[a]	0	(0.19)	0
Meteorological tower	(0.0014)	0	(0.0001)	0
Underground distribution line	5.3	0	(4.6)	0
Service road	(7.5)	0	(16.4)	0
Access road	21.1	8	0	0.9
Overhead distribution line	45.1	49.7	0	1.4
Laydown areas and batch plant	4	2	0	2.0
Substation	0	10	0	0
Total	246.5	67.7	6.5	4.3

a. Acreages in parentheses are accounted for within the WTG corridor acreage total and are provided for informational purposes only.

The temporary [illegible] [illegible]

Long-Term Disturbances from Construction Activities. [illegible]

Threatened, Endangered, and Sensitive Plant Species. [illegible]

Table 4.2. [illegible]

Facility Type	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

The proposed project would result in impacts (crush, remove, and/or reduce or eliminate habitat) on two SOC plants observed within the proposed laydown area in Section 16 of Township 24 South, Range 58 East. Approximately 1.1 ac of rosy twotone beardtongue and yellow twotone beardtongue habitat would be impacted during the use of the Wilson Pass laydown area. This may include loss of individual plants due to equipment movement that could crush or move individual plants, displacement of seed banks, loss of essential habitat features, and permanent loss of habitat. Approximately 45 individual plants were observed within the washes throughout the proposed laydown area. Mitigation of the impacts on these two species would be required.

The project would also disturb a large number of cacti and yuccas. Nevada State Law (NRS 527.060–.120) protects any species in the Cactaceae family and members of the genus *Yucca* and *Agave*. The entire project area supports a large and diverse cacti and yucca population. Ground disturbance poses a potential for impacts on these species, in which mitigation measures would be necessary. Potential impacts on cacti and yuccas could be reduced by placement of structures in areas with low densities. Those that could not be avoided would be removed and transplanted. A restoration plan that includes the salvage and use of cacti, yucca, and agave impacted by this project will be developed as part of the construction, operations, and maintenance plan. Coordination with the BLM botanist would be required to determine the exact percentage of cacti and yucca that will be used in the reclamation plan.

The Proposed Action would not substantially reduce or diminish habitat for, or populations of, any threatened, endangered, or sensitive plant species. With implementation of proposed mitigation measures, impacts on these plant species would not be significant.

Noxious Weeds. Land that has been graded and cleared is vulnerable to noxious weed invasion. Seeds can be easily introduced into these areas via construction vehicles that have been in other areas where noxious weeds are present. Seeds or plant material may become lodged between tire treads, in the coils of a winch, behind the license plate, or in cracks and crevices on the underside of the vehicle. Residual impacts may occur after project construction and implementation of the vegetation reclamation plan through natural processes and by increased human access and use of the area. The construction and operation activities associated with this project could introduce noxious weeds into the surrounding vegetation communities. Other adverse impacts from the spread of noxious weeds include:

- Decrease in biological diversity of native ecosystems
- Reduction in water quality and availability for native wildlife species
- Decrease in the quality of habitats for native wildlife
- Alterations in habitats needed by threatened and endangered species
- Increased direct and indirect competition with native species
- Health hazards, because some species are poisonous to humans, wildlife, and livestock.

With the implementation of mitigation measures, none of the aforementioned impacts associated with noxious weeds are likely to occur; therefore, impacts of noxious weeds would not be significant.

4.5.1.2 Impacts on Terrestrial Wildlife

This section evaluates potential impacts on wildlife species that are known or likely to occur in the project area. The primary direct adverse impact of construction activities on wildlife would be the removal or disturbance of wildlife habitat. Construction activities associated with the project would cause a temporary

and permanent disturbance to wildlife in the area. The temporary loss of wildlife habitat is estimated to be approximately 754 ac with a permanent disturbance of 325 ac. Clearing and grading activities would result in the direct destruction of some forms of wildlife that are not mobile enough to avoid construction operations. These impacts would be limited primarily to reptilian species, burrowing mammals, and possibly some age classes of birds. Larger, more mobile species of wildlife may avoid the initial clearing activity and move into adjacent areas. It is assumed that adjacent habitats are at their carrying capacity for the species that live there. Competition for resources would occur where new individuals are forced into adjacent habitats, potentially resulting in decreased birth rates or increased mortality rates such that populations are reduced to a level that the habitat can support (Dempster 1975). An influx of wildlife into adjacent areas may also cause changes in species composition and community dynamics.

Most wildlife habitat in the footprint of the facilities and upgraded and new access roads would be permanently removed. The improvements to existing roadways and the construction of new access roads may lead to increased human access into the area and could result in an increase in wildlife disturbance, off-road vehicle use, and illegal hunting. The improvement and construction of new roadway facilities may increase the use of the area by feral animals. An increase in feral animal populations would have a negative impact on resident wildlife populations.

Increased noise, dust levels, and human activity during construction would disturb or disrupt the foraging and breeding of resident wildlife species in the project area. These effects would be limited to the perimeter of the construction area and are expected to be temporary in most cases.

Impacts on wildlife along electric distribution lines and staging areas would be temporary, allowing vegetation to regenerate following construction and wildlife to return to the area. In the long-term, the construction of the electric distribution lines would not significantly increase habitat fragmentation because they would largely parallel an existing utility ROW.

The distribution lines would also pose a potential hazard for wire strike by birds; however, locating the proposed transmission lines adjacent to existing transmission lines within an existing utility ROW would minimize the potential for wire strikes. Ground wires pose a threat to birds due to potential wire strike. Spacing of conductors and ground wires would be greater than the wingspan of the largest birds expected to occur in the project area, so that the potential for electrocution of birds would be minimized.

The operation of the proposed WGF would not substantially reduce or diminish habitat for most forms of wildlife in the region. Wildlife resource impacts due to the long-term operation of the proposed facility would be substantially less than temporary construction impacts. Estimates for long-term project impacts on wildlife habitat are summarized in Table 4-2 (p. 4-8).

Construction and operation of the WGF and ancillary facilities is not expected to pose a significant adverse impact on most forms of wildlife. Implementation of mitigation measures would reduce potential impacts on wildlife species caused by the construction and operation of the Proposed Action to an acceptable level.

Desert Bighorn Sheep. Considerable research has been conducted during the later half of the twentieth century on bighorn sheep populations in the southwest. These studies have focused on distribution and home range, habitat requirements, foraging, population dynamics, breeding and reproduction, and mortality related to natural causes, hunting, and competition from sympatric exotics, to name a few. Studies of the populations of desert bighorn sheep located in Death Valley National Monument, the Kingston Range, and Clark and Mesquite Mountains of California, northwest, west, and southwest of the Proposed Action area, have been conducted as recently as the 1980s and 1990s. Consequently, the assessment of impacts for the purposes of this document are extrapolated primarily from these studies and secondarily from other earlier regional studies.

Bighorn sheep with adequate water and food and ample escape terrain can be quite tolerant of man. Breyen (1971) reported that sheep have become accustomed to the presence of man as indicated by their lack of shyness both at the (Colorado) river and in the crossing of highways in Boulder City and the Eldorado Valley. This is not to say that the potential disruptions caused by continued encroachment into sheep habitat should be ignored. It is likely that increased access to and use of the project area would affect bighorn sheep distribution and their use of the area. Hansen (n.d.) stated that bighorns can thrive in areas where human use is fairly high, only if proper planning is first undertaken to ensure the sheep would not be harassed excessively. However, Monson and Sumner (1980) contend that where water and food are scarce and escape terrain limited, bighorn are more disturbed by man's activities. This is the likely case within the Proposed Action Area, where surface water supplies are limited, escape terrain (rugged ridges) are proposed as sites for WTGs, and new access roads through the area would likely increase human activities.

Jeager (2001) suggests there are genetically based limiting factors to human disturbance tolerance in some herds of bighorns. That is, those herds that have experienced a higher percentage of reintroduction/relocation breeding tend to have more tolerance for human disturbance in their habitat, particularly during lambing season, than those herds that have not bred in the reintroduction gene pool. The herd(s) within the Proposed Action area have not been involved in the state of Nevada's reintroduction/relocation program. Bighorn sheep tolerate some disturbance, but continued, frequent, and especially new forms of disturbances cause them to avoid an area (Monson and Sumner 1980). Interestingly, bighorn sheep seem quite tolerant of steady traffic on through highways or occasional traffic on back roads, but not so tolerant of patterns of use that result in unexpected disturbance. An example of this type of disturbance is a vehicle suddenly rounding a bend on a little-used dirt road, or stopping, with the people getting out and milling around or concentrating their attention on the bighorn.

Bighorns have displayed a great variety of reactions to man-caused noise. It appears that the physical location of the sheep to the source of the noise may be all-important (Devan 1958). That is, if the sheep are out in the open and/or near escape terrain, they appear to remain calm and occasionally interested in the noise(s). Lewis (1960) reported that sheep would tolerate the noise of construction work, including blasting and heavy equipment moving, provided it is not so extensive that they leave the area permanently.

The Proposed Action would result in habitat reduction and fragmentation both in the short-term and the long-term. Habitat fragmentation is a major cause of population reduction and sometimes extinction (Wilcox 1980). Desert bighorn sheep generally tend to favor their hereditary ranges, and the herd(s) within the Proposed Action area may not be able to migrate to other locations with suitable habitat conditions or these locations may already be at carrying capacity. Geist (1971) raises concerns that range expansion by ewes may not occur for several years because bighorn sheep are not very exploratory and do not colonize new areas rapidly.

Developments on the periphery or in the heart of the bighorn's escape terrain can have disturbing effects, which vary with respect to their "psychological" effect on, and continued use of, the area (Munson and Sumner 1980). As a rule, sheep seek escape by climbing uphill away from man. Conversely, when surprised from above, they take headlong flight down a steep escarpment and continue running until distance provides safety or they climb above the intruder. This survival strategy may be affected by the placement of WTGs on the ridges within the project area.

Another area that is essential to the bighorn's well-being and survival is the lambing area. Lambing areas generally are on steep slopes, with fairly abundant grasses and forbs in late winter and in spring. In many parts of a bighorn's range, lambing areas are limited. Moreover, ewes would seldom lamb in an area disturbed by outsiders. Lambing areas are particularly critical, and permanent human occupancy near key lambing areas would cause bighorn sheep to move away (Monson and Sumner 1980). Desert bighorn sheep utilize much of the upper elevations of the project area as lambing habitat. These areas would be disturbed and adversely

Bighorn sheep [illegible]

Jaeger (2000) suggests [illegible]

Bighorns have [illegible]

The Proposed Action would [illegible]

Disturbances on the [illegible]

Another area that is [illegible]

impacted during construction and operation of the proposed project. During construction of the project, these animals would likely be displaced from the area, which serves as a regionally important lambing area (Cummings 2001). This impact would be considered significant and mitigation measures would be required.

The increased level of disturbance from construction, O&M activities, and habitat reduction and fragmentation caused by the physical presence of humans, the presence and operation of the turbines, and increased human visitation to the site would also adversely impact desert bighorn sheep.

Wild Horse and Burro. The construction of the project is not expected to negatively impact wild horses or burro populations or their habitat. Access roads would utilize existing roads to the greatest extent possible. Improvements to existing roads would slightly reduce available habitat in the HMA. Within the HMA, most project facilities are located along steep ridgelines that provide little habitat for burros and no habitat for horses. Habitats to be disturbed on Table Mountain are outside the HMA and are not utilized by wild horses and burros. A BLM-approved restoration plan will be incorporated into the project to restore all temporary use areas. Speed restrictions on access and service roads, in addition to warning signs, would reduce the potential for vehicular collisions with animals.

Increased human presence and construction noise may cause wild horses and burros to temporarily avoid the project area; however, the HMA herd does not heavily use this area due to the lack of reliable surface water. The only available natural water sources, Cave Spring and North Cave Spring, are located over 1,500 ft away from the proposed project facilities in the Wilson Pass area. The project is not expected to affect the limited water resources available to horses or burros. Burros are known to utilize Cave Spring, but there is no evidence they use the guzzler in Deadmans Canyon. Wild horses are not known to utilize any of the water sources in the project area. The operation of the proposed project is not expected to alter use of the HMA by the wild horse or burro populations. While previous studies in the region have demonstrated that bighorn and wild horse and burro do not generally utilize the same water sources, a lack of water overall in a given area would naturally generate competition for the resource, and such could be the case in the Table Mountain project area. There are two surface water sources available to these species within the project area. Any competition imposed on the bighorn by the presence of wild horse and burro would be potentially significant. However, wild horse and burro range in this area is relatively small, although the HMA includes the northern two-thirds of the project area.

While some researchers maintain that there exists significant habitat overlap and, therefore, competition, it has been sufficiently demonstrated that bighorn prefer higher elevations and steep rugged slopes (slopes of 35% or greater), whereas wild horse and burro range predominantly on gentler slopes, in open spaces, in washes, and at slightly lower elevations (Dunn 1984; Leslie and Douglas 1979). The major source of food for the wild horse and burro tends to be forbs, followed by grasses and shrubs. The opposite appears to be the case for the bighorn, having a preference for grasses and shrubs over forbs (Breyen 1971; Ginnett 1982; McMichael 1964).

Given the known range of the Spring Mountains wild horse and burro populations, and the terrain, habitats, and available water sources within the project area, it is unlikely that the Proposed Action would contribute to competition for habitat and resources between bighorns and wild horses and burros.

Avian. The USFWS has contended that in some circumstances, collision-related avian mortality may constitute violations of the MBTA, the BEPA, the ESA, and/or the NRS (501) unless appropriate permits are obtained and steps are taken to minimize detrimental impacts.

These laws are primarily designed to prevent and/or penalize "takings" of these species. There have been conflicting court decisions about whether, and in what circumstances, these prohibitions apply to unintentional conduct such as the construction or maintenance of facilities with which birds or other protected

species might collide or otherwise be harmed. The USFWS has issued a memorandum that focuses the inquiry in these circumstances on the WGF developer's efforts to reduce the impacts on wildlife and to develop safer wind power technology, rather than viewing individual collisions as violations of the law. The USFWS had not yet determined whether particular avian mortality permits would be required for WGF installation.

The proposed WGF would be one of the first of its kind in Nevada; thus potential avifauna mortality is unknown. Over the last decade, avian mortality studies have been conducted at WGFs in the United States and abroad. The results of these studies in California, Minnesota, and Oregon suggest that turbine-caused avian mortality would likely occur due to the Proposed Action. A detailed discussion of these studies and the results is provided in Appendix E.

Given the range of avian fatality data among the various WGFs, it is evident that significant raptor mortality is occurring at those facilities that were sited in areas with high raptor concentrations and a high prey base. The project area, based on the Spring 2001 field investigations, does not support a high raptor population. However, the Spring Mountains have been identified as an important fall migration corridor for raptors (Millsap 1980). Using the range of avian fatalities cited at Buffalo Ridge, Minnesota, and Vansycle Ridge, Oregon (Anderson et al. 2000), the proposed project could experience bird fatalities ranging from 0.57 to 1.95 fatalities/turbine/year. This range may be overestimated since the proposed project would not be sited near agricultural land, water, or wetlands, as were the WGFs in Minnesota, and Oregon. The birds most at risk would likely be nocturnal migrants. Since the death of even one migratory bird could be considered a violation of the MBTA, potential impacts on birds would be considered significant and would require mitigation.

Construction and operation of the proposed WGF would have direct and indirect impacts on avian populations. Direct impacts would include the loss of habitat from construction of the WGF and associated facilities; an increased risk of avian mortality from collisions with WTGs, meteorological-tower guy wires, and overhead distribution lines; and electrocution hazards from the electric substation and overhead distribution lines. The direct loss of habitat from the development of the proposed WGF would not have significant impacts on local or migrant avian populations. The potential for collisions with WTGs and meteorological towers may represent a significant impact if the individual birds at risk have special significance, as in the case of endangered or threatened species or special status species. However, the risk of individual fatalities may not necessarily represent a risk to a population of birds.

Indirect impacts would include increased human use of the area for operations and maintenance, increased recreation in the area, and changes in the vegetation community. Changes in vegetation may indirectly affect mortality rates and/or avifaunal reproductive success, or changes in prey distribution and abundance. Indirect impacts on avian populations would be low due to the small acreage of habitat impacted and the small changes in vegetation composition associated with construction and operation of the Proposed Action.

Direct impacts on avian species are potentially significant and would require some form of mitigation or minimization. The USFWS generally supports wind power development to provide a clean, renewable energy source. The USFWS may direct that the proposed WGF be constructed and operated to meet stipulations to reduce impacts on birds and other wildlife. Stipulations could include but are not limited to using state-of-the-art technology known to minimize wildlife impacts and locating facilities away from known avian concentration areas. The Proposed Action is incorporating known minimization measures into the project design to reduce avian risk.

4.5.1.3 Impacts on Threatened, Endangered, and Sensitive Wildlife Species

This section discusses potential project-related impacts on special status wildlife species.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] Impacts on Threatened, Endangered, and Sensitive Wildlife Species

[illegible]

Desert Tortoise. While most of Clark County is considered desert tortoise habitat and the potential for impact is relatively high, the occurrence of this species within the Proposed Action area ranges from very low to low. Direct impacts on the desert tortoise resulting from construction activity would include removal of habitat, loss or displacement of habitat features such as cover and forage, and crushing and/or loss of individual animals. The Proposed Action would result in the temporary disturbance of approximately 270 ac of tortoise habitat. Permanent impacts on tortoise habitat would total 110 ac.

Indirect impacts would occur during construction and operation activities associated with the Proposed Action. Construction activity would result in indirect degradation of habitat due to soil disturbance; compaction; habitat fragmentation; increased levels of noise, traffic, and equipment movement; increased human activity; and a greater risk of predation on juveniles by raptors that would use the distribution line structures for perching sites.

The proposed project would require formal consultation under Section 7 of the ESA of 1973, as amended. A result of that consultation would be a Biological Opinion issued by the USFWS. The Biological Opinion would specify reasonable and prudent measures and conservation recommendations to minimize impacts on the desert tortoise. As part of the conservation recommendations, remuneration fees would likely be required for impacts on desert tortoise habitat. Currently, remuneration fees for the desert tortoise are $603 per ac, adjusted annually for inflation.

With the implementation of the USFWS's reasonable and prudent measures and conservation recommendations, impacts on the desert tortoise are not considered significant.

Bats. To date, most research concerning WGFs and wildlife has concentrated on avian mortality. Bats can also be impacted by WGFs, communications towers, and other utility structures. In 1998 and 1999, 184 bat fatalities were recorded at Buffalo Ridge, Minnesota, where 354 wind turbines are in operation (Anderson et al. 2000). Bat fatalities at the Minnesota WGF have ranged from 0.26 fatalities/turbine/year to 2.04 fatalities/turbine/year. At VanSycle Ridge, Oregon, 10 dead bats were found in the first year of carcass searches (Anderson et al. 2000). An interesting trend in bat mortality at WGFs is that the majority of bat mortalities tend to be tree-dwelling bats of the genus *Lasiurus* (Keeley 1999; Anderson et al. 2000).

Potential impacts on bats from construction and operation of the Proposed Action could range from moderate to significant. Foraging patterns could be temporarily impacted by nighttime construction activity and lighting. Numerous caves and mines occur in the project area and are likely to be used by several species of bats; however, none of the construction or O&M activities are anticipated to directly impact any of the caves or mines in the project area that may provide roosting habitat for bats. If federal SOCs or state sensitive species were killed, impacts would be considered significant. If fewer numbers of nonsensitive bat species were impacted, impacts could be considered low to moderate. In conjunction with the postconstruction avian monitoring, TMWC would also conduct bat mortality searches to quantify impacts of the WGF on bats.

Banded Gila Monster and Chuckwalla. The banded Gila monster and chuckwalla are two sensitive reptile species that may be impacted from construction and operation of the proposed WGF. Suitable habitat is present to support both species, although the Chuckwalla was the only one observed during field investigations. The construction and operation of the proposed project is not expected to adversely impact populations of either species.

4.5.1.4 Impacts on Threatened and Endangered Aquatic Species

No direct impacts on listed aquatic species would occur from the construction or maintenance of the Proposed Action.

4.5.2 Alternative A

The impacts on biological resources under Alternative A would be similar to the impacts associated with the Proposed Action, except that an additional 0.5 ac of land would be affected. Alternative A would result in the temporary disturbance of approximately 754 ac of habitat and the permanent loss of 325.5 ac of habitat. Potential impacts on avifauna and bats would be greater for this alternative since it would include 22% (34 WTGs) more turbines. Impacts on other wildlife species would be similar to those of the Proposed Action. Mitigation measures would be required for impacts on bighorn sheep, avifauna, and bats. Impacts on the desert tortoise would be similar to the Proposed Action.

4.5.3 Alternative B

The impacts on biological resources under Alternative B would be slightly less than for the Proposed Action. Alternative B would permanently remove 0.3 ac less of habitat than the Proposed Action. Alternative B would result in the temporary disturbance of approximately 754 ac of habitat and the permanent loss of 324.7 ac of habitat. Impacts on birds and bats would be the least significant for this alternative as it represents a 12% decrease in the number of WTGs from the Proposed Action and a 28% (18 WTGs) decrease in the number of WTGs from Alternative A. Impacts on birds, bats, and bighorn sheep could still be significant from this alternative and mitigation would be required for these resources. Impacts on the desert tortoise would be similar to the Proposed Action and Alternative A.

4.5.4 No-Action Alternative

Under the No-Action Alternative, there would be no approval of ROW applications and the proposed project would not be built. Therefore, there would be no impacts related to biological resources.

4.6 Cultural Resources

Impacts of the Proposed Action, Alternative A, and Alternative B on cultural resources cannot be determined at this time. The BLM and the Nevada SHPO have not made National Historic Register eligibility determinations for several archaeological sites, pending testing of five historic sites and one prehistoric site as outlined in Table 3-6 (p. 3-42). Requests for formal consultation with interested and affected Native American Tribes have been received. This consultation would determine if TCPs are located within the APE. The final site eligibility determinations and the assessment of potential TCPs within the project area would be included in the FEIS

4.7 Transportation and Circulation

For the purposes of this EIS, impacts on transportation and circulation would be considered significant if they resulted in the following:

- A decrease in the roadway LOS below D
- A decrease in the intersection LOS below D
- A decrease in the ramp intersection LOS below D
- Adverse effects on road pavement integrity
- Adverse effects on public safety.

The future LOS determines whether the intersections under investigation are efficient at the time of build-out. This analysis compares the efficiency of the intersections at build-out as well as 20 years into the future. For the purposes of this EIS, impacts on transportation and circulation would be significant if there was an increase in traffic that was substantial in relation to the existing and anticipated future traffic volumes and the capacity of the street system, resulting in a poor LOS.

4.7.1 Proposed Action

4.7.1.1 Impacts on Anticipated Traffic Volume

Future traffic volumes in the vicinity of the site were estimated to determine anticipated traffic impacts on the roadway network by the proposed WGF. An areawide average growth per year of 2.95% was estimated based on average daily traffic volumes from permanent count stations maintained by NDOT. The 2.95 factor was applied to existing traffic volumes and was used to determine growth in the area.

4.7.1.2 Impacts on Trip Generation and Distribution

Trip generation and distribution are both tools used to assess increased roadway volumes caused by site-generated traffic. These two techniques aid in determining the level of impact at specific intersections. The trips generated from the site are distributed according to existing and future attractions in the vicinity of the proposed development.

Data on trip generation rates for WGFs and ancillary facilities is not available from the Institute of Transportation Engineers Trip Generation, Sixth Edition. During operation, fewer than 30 workers would be required to operate and maintain the WTGs and associated facilities on a daily basis. For analysis purposes, a worst-case scenario was assumed where all 30 workers would enter the site during the A.M. peak period and exit the site during the P.M. peak period with an auto occupancy rate of 1.0.

Anticipated increases in traffic volume would not impact or cause a decrease in LOS, would not cause adverse effects on road pavement integrity, and would not cause adverse effects on public safety. Therefore, impacts on traffic volume would not be significant.

4.7.1.3 Impacts on Future Intersection Levels of Service

The anticipated P.M. peak-hour traffic flows were analyzed to determine the future levels of service at the intersections of SH 161 and Wilson Pass Road, I-15 Westbound and SH 161, and I-15 Eastbound and SH 161. Results indicate that all of the study intersections would continue to operate at acceptable LOS under year-2002 and year-2022 traffic conditions with the additional site traffic. Therefore, impacts on intersection LOS, pavement integrity, and public safety would not be significant. LOS calculations can be found in Appendix F and are summarized in Table 4-3 (p. 4-17).

4.7.1.4 Construction Impacts

Impacts on Traffic. Traffic impacts imposed on the surrounding roadway network by the proposed construction and operation of the WGF and ancillary facilities in the vicinity of Table Mountain are expected to be minimal. The construction phase would last approximately 8 months (240 days), would require approximately 70 construction workers, and would start as soon as the requisite project approvals, permits, and ROW are obtained.

During the construction phase of the WGF, the work force and additional truck traffic could increase daily traffic volumes by as many as 170 vehicles. It is estimated that off-site truck traffic would increase traffic volumes by 30 trips per day. For analysis purposes, it was assumed that 2 trucks would enter the area and 2 trucks would exit the area during the A.M. and P.M. peak hours. It is estimated that the 70 construction

The future LOS [illegible] analysis [illegible]

4.7.1 Proposed Action

4.7.1.1 Impacts on Anticipated Traffic Volumes

[illegible]

4.7.1.2 Impacts on Trip Generation and Distribution

Trip generation and distribution [illegible]

[illegible]

Anticipated increases in traffic volumes [illegible] increases on traffic volumes would not be significant.

4.7.1.3 Impacts on Future Intersection Levels of Service

The anticipated [illegible]

4.7.1.4 Construction Impacts

Impacts on Traffic. Traffic impacts [illegible]

During the construction phase of the [illegible]

Table 4-3. Levels of Service.

	Level of Service							
	Existing Background		Year 2002 Background		Year 2002 Background with Site Traffic		Year 2022 Background with Site Traffic	
Intersection and Movement	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
SH 161 and Wilson Pass Road								
Northbound: left	A	A	A	A	A	A	A	A
Eastbound: left/right	A	A	A	A	A	A	A	A
I-15 Westbound and SH 161								
Westbound: left/through/ right	A	A	A	B	A	B	B	B
Northbound: left	A	A	A	A	A	A	A	A
I-15 Eastbound and SH 161								
Eastbound: left/through/ right	A	A	A	A	A	B	B	B
Southbound: left/through	A	A	A	A	A	A	A	A

workers would add 140 trips per day. It was also assumed that 70 construction workers would enter the area during the a.m. peak hour and exit the area during the p.m. peak hour. All three intersections would operate at acceptable levels of service during the construction period. LOS calculations can be found in Appendix F and are summarized in Table 4-4 (p. 4-18).

Impacts on Levels of Service During Construction. Anticipated P.M. peak-hour traffic flows were analyzed to determine the LOS during construction at the intersections of I-15 and SH 161 and the intersection of SH 161 and Wilson Pass Road. Results indicate that all study intersections would continue to operate at acceptable LOS with the addition of construction traffic. LOS calculations can be found in Appendix F.

Construction traffic would be short-term and would not erode road pavement, cause other adverse effects to road pavement integrity, or cause adverse effects on public safety.

Because of the above-mentioned factors, impacts due to construction of the Proposed Action would not be significant.

4.7.2 Alternative A

The impacts on transportation resources under Alternative A would be slightly greater than the impacts associated with the Proposed Action. More trucks would be required to haul WTGs and parts and would result in 102 more trips assuming 3 trucks per WTG. Impacts associated with Alternative A would not be significant since these trips would be spread over an 8-month construction period.

4.7.3 Alternative B

The impacts on transportation resources under Alternative B would slightly less than the impacts associated with the Proposed Action. Fewer trucks would be required to haul WTGs and parts to the project area, resulting in 54 less trips than the Proposed Action. Impacts associated with Alternative B would not be significant.

Table 4-4. Levels of Service with and without Construction.

	Level of Service			
	Existing		Existing + Construction	
Intersection and Movement	**A.M.**	**P.M.**	**A.M.**	**P.M.**
SH 161 and Wilson Pass Road				
Northbound: left	A	A	A	A
Eastbound: left/through/right	A	A	A	A
I-15 Westbound and SH 161				
Westbound: left/through/right	A	A	A	B
Northbound: left	A	A	A	A
I-15 Eastbound and SH 161				
Eastbound: left/through/right	A	A	A	B
Southbound: left/through	A	A	A	A

4.7.4 No-Action Alternative

Under the No-Action Alternative, there would be no issuance of ROW grants and the proposed project would not be built. Therefore, there would be no impacts related to transportation.

4.8 Climate and Air Quality

For the purposes of this EIS, impacts on climate and air quality from construction and operation of the Proposed Action would be considered significant if they resulted in the following:

- Potential emissions attributed to the Proposed Action or alternatives plus background concentrations cause or contribute to a new violation of any ambient air quality standard.
- Potential emissions aggravate existing violations.
- Potential emissions attributed to the Proposed Action or alternatives delay attainment of air quality standards.

4.8.1 Proposed Action

4.8.1.1 Impacts of Construction on Air Quality

Temporary and localized increases in criteria pollutant concentrations would occur during the construction phase of the WGF. Construction of the Proposed Action or alternatives is expected to last approximately 8 months, entailing the following actions:

- Installation of erosion controls, site clearing and preparation
- Road and pad construction
- Foundation construction and tower erection
- Trenching and placement of underground utility lines

Table 4-6. [illegible]

[illegible]					
[illegible] and Mitigation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]					
[illegible]	A	[illegible]	[illegible]	A	A
[illegible]	A	A	A	A	A
[illegible]					
[illegible]	A	A	A	A	A
[illegible]	A	A	A	A	A
[illegible]					
[illegible]	A	A	A	A	A
[illegible]	A	A	A	A	A

4.7.4 No Action Alternative

Under the No Action Alternative, [illegible]

4.8 Climate and Air Quality

For the purposes of this EIS, [illegible] Proposed Action [illegible]

- [illegible]
- [illegible]
- [illegible]

4.8.1 Proposed Action

4.8.1.1 Emissions of [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

- Construction of overhead distribution lines and communications system
- Final road grading and revegetation of disturbed soils.

Emissions. Emissions would consist of tailpipe emissions from the exhaust of construction equipment, particulate matter emissions from the concrete batch plants, combustion emissions from the diesel-fueled generators associated with the concrete batch plants, fugitive dust emissions from vehicular traffic, and fugitive dust emissions from soil and rock disturbances (EPA 1998a). These emissions would vary with the time of day and construction activity.

Site Clearing, Preparation, and Installation of Erosion Controls—Site clearing and preparation would require the use of heavy diesel-powered earth-moving equipment including bulldozers, scrapers, dump trucks, and front-end loaders. Site clearing and preparation would occur at all locations where facility equipment would be installed. To minimize soil erosion during construction, BLM standards would be followed. This includes the use of silt fences, soil stabilizers, check dams, sediment control basins, and sediment traps where appropriate.

Three laydown areas, each 5.0 ac in size, would be established for the WGF. The laydown areas would be used to store materials and equipment and serve as staging areas for the installation of the wind turbine generators. A portable concrete batch plant would be located in each of the three laydown areas. There would be no fuel storage in the laydown sites—all fuel for construction equipment would be dispensed from a mobile service truck.

Primary emissions include fugitive dust emissions from soil disturbance and tailpipe emissions from construction equipment (EPA 1995).

Road and Pad Installation—Primary emissions expected to result from road and pad installation are fugitive dust from excavation, drilling, and soil disturbance. Additionally, there would be tailpipe emissions associated with construction equipment used to excavate, grade, or drill in soil and rock.

Foundation Construction and Tower Erection—The major stationary source of emissions during foundation construction would be the concrete batch plants located in each laydown area. Primary emissions from the concrete batch plants would be particulate matter generated from materials loading, unloading, and storage (EPA 1986). There would be approximately 2,400 yd^3 of sand and 1,600 yd^3 of aggregate stored at the laydown area to be used in concrete production. Portland cement and bonding agents would be stored in a trailer. The water required for concrete production would be supplied by mobile water trucks.

A 125-kW diesel-fueled electric generator would be used to supply electricity to each concrete batch plant. The diesel generators would be a source of CO, PM, SO_2, NO_x and VOC emissions (EPA 1999). The concrete batch plants would be operated no more than 16 hours per day.

Foundation construction would result in fugitive dust emissions and tailpipe emissions from concrete handling equipment such as concrete trucks, mixers, vibrators, and pumps. Fugitive dust would also be produced from backfilling the foundations constructed in soil. Some foundations may be constructed in rock, requiring the use of drills, pile driving, and/or blasting activities that produce fugitive dust emissions. Any pile driving or blasting activities would be limited to short durations during the daytime only. Foundation construction activities would occur for each WTG, each meteorological tower, the electrical substation, electrical transformers, and possibly some limited activity for the distribution lines. Assembly of the meteorological towers and WTGs would involve the use of mobile cranes. Operation of the mobile cranes would result in CO, NO_x, SO_2, PM and VOC emissions (EPA 1998b).

- Construction of [illegible] facilities [illegible]
- Final road grading and revegetation of disturbed areas

Emissions. Emissions would consist of exhaust [illegible] during the operation of construction equipment, particulate matter [illegible] from [illegible] roads, [illegible] construction [illegible] associated with the [illegible] (PM10) [illegible] time of day and construction activity.

Site Clearing, Preparation, and Installation of [illegible] required [illegible] [illegible] appropriate.

Three [illegible] [illegible] [illegible] [illegible] [illegible] truck.

Primary emissions include [illegible] emissions from equipment (EPA 1985).

Road and Pad Construction—[illegible] with the construction equipment used [illegible] [illegible].

Foundation Construction and Tower Erection—[illegible] foundation construction would be the [illegible] (EPA 1985). There would be approximately [illegible] hydrants [illegible] to be used in concrete production. [illegible] basis. The water required for concrete production would be [illegible].

A [illegible] kW diesel-fueled electric generator would be used to supply [illegible]. The diesel generator would [illegible] (EPA 1985). The [illegible] would be operated no more than 10 hours per day.

Foundation construction would [illegible] equipment such as concrete trucks, [illegible] of drills, [illegible] activities, would be [illegible] emissions would occur [illegible] and [illegible] hours and WTGs would require the use of [illegible] CO, NOx, SOx, PM and VOC emissions (EPA 1985).

Trenching and Placement of Underground Utility Lines—The construction of trenches for underground electrical and communications cables would produce fugitive dust emissions. The trenches would be located along the length of each wind-turbine string corridor, with a width of 3 to 5 ft. In some cases, a trench would be constructed from the end of one turbine string to the end of an adjacent string to link more turbines together via the underground network. The trenches would be excavated to a depth of 3 to 4 ft. After the electrical and communication cables have been installed, the trenches would be back filled and revegetated.

Construction of Overhead Distribution Lines and Communication System—Construction of the overhead distribution line and communications system would include preparation of the ROW, assembly of structures, erection of structures, stringing of conductors and ground wires, and restoration. Approximately 14 mi of overhead distribution lines would be erected. Major air pollutant emissions would be generated by soil disturbances releasing fugitive dust.

Final Road Grading and Revegetation of Disturbed Soils—After construction of the WGF, the areas disturbed during construction would be revegetated. Where possible and practical, inactive areas would be stabilized after cutting, drilling, filling, or grading. Emissions include tailpipe emissions from construction equipment used to stabilize disturbances and fugitive dust produced during stabilization actions.

Analysis of Impacts from Construction. To determine the potential worst-case air impacts from construction activities, exhaust and dust emission rates were evaluated for each emissions source, assuming that proposed mitigation measures are implemented. Worst-case daily dust emissions are expected to occur during the first 1 to 2 months of construction when laydown areas, ROWs, and access roads are prepared. Worst-case daily exhaust emissions are expected to occur during the installation of the wind turbine generators, at which time vehicular traffic is anticipated to be at a maximum.

Due to the construction schedule for the WGF, construction activity is assumed to occur simultaneously at the three locations. To estimate worst-case emissions, it was assumed that all construction equipment would be fully utilized at each site, with several different construction actions occurring. Thus, at the time that concrete is poured for a WTG foundation, the trenches for electrical cables can be excavated, while backfilling, soil stabilization and revegetation are completed at other areas of the site. The concrete batch plant was assumed to operate 16 hours per day.

Emissions from construction equipment, haul trucks, and other mobile sources were estimated using emission factors developed by the EPA's Office of Mobile Sources (EPA 1986, 1995, 1998a, 1998b, 1999). Construction equipment was assumed to operate at a maximum level of 12 hours per day.

Emissions from the diesel generator associated with operation of the concrete batch plant were estimated using Section 3.3 of AP-42 (EPA 1999). Table 4-5 (p. 4-21) shows daily maximum exhaust emissions from the diesel generator, construction equipment, haul trucks, and other mobile sources for each location.

Fugitive dust emissions result from soil disturbances, material handling, transfer and storage at the concrete batch plants, and vehicular travel on paved and unpaved roads. Fugitive dust emissions from soil disturbances were estimated using the amount of soil to be disturbed, mitigation measures to be implemented, and emission factors based on Section 13.2.3 of AP-42 (EPA 1998a). To estimate fugitive dust emissions from process operations at the concrete batch plant, an overall emission factor of 0.2 lb/yd^3 of concrete was used. Fugitive dust emissions from outside storage of aggregate and sand at the concrete batch plants were estimated using Section 11.19.2 of AP-42 (EPA 1986), while emissions from material transfer were estimated using Section 13.2.2 of AP-42 (EPA 1998a). Dust emissions from vehicular traffic were estimated using emission factors from Sections 13.2.2 and 13.2.1 of AP-42 (EPA 1998a) and silt and moisture values reflective of an arid climate. Worst-case daily fugitive dust emissions for each location are provided in Table 4-6 (p. 4-21).

Trenching and Placement of Underground Utility Lines. [illegible]

Construction of Overhead Distribution Lines and Electric Substations. [illegible]

Final Road Grading and Revegetation of Disturbed Areas—[illegible]

Analysis of Impacts from Construction. [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Table 4-5. Maximum Worst-Case Daily Exhaust Emissions from Diesel Generator, Construction Equipment, Haul Trucks, and other Mobile Sources for Each Location.

	Emission Type				
Source Type[a]	NO_x (lb/day)	CO (lb/day)	VOC (lb/day)	SO_x (lb/day)	PM_{10} (lb/day)
Diesel generator	63	14	5	4	4
Construction equipment	647	797	94	16	10
Concrete haul trucks	182	225	26	4.5	3
Mobile sources	776	1124	122	22	16
Total	1668	2160	247	47	33

a. Assumes continuous operation 12 hours per day for emergency generators; all other equipment operates continuously for 16 hours per day.

Table 4-6. Fugitive Dust Emissions for Each Laydown Area and Associated Construction.

Source	Total Fugitive Dust Emissions (lb)	Maximum Daily Emission Rate (lb/day)
Soil disturbance for wind turbine generator placement[a]	15,540	259
Concrete batch plant process emissions[b]	1,610	32
Fugitive dust emissions from material storage	805	16
Electric distribution line ROW construction	142,800	2,380
Soil disturbance for construction of material laydown areas[a]	4,200	70
Access roads and service roads	122,640	2,044
Soil disturbance for electric substation construction[a]	8,400	140
Fugitive emissions from vehicular traffic	4.06 lb VMT[c]	3,410
Soil disturbance for underground utility trench construction[a]	20,160	336

a. Assumes soil is disturbed no more than 2 months.

b. Based on 161 yd^3 of concrete per turbine per transformer pad.

c. VMT = Vehicle mile traveled.

Air Dispersion Model Description—Ambient air quality impacts resulting from emissions generated during construction of the Proposed Action were estimated using the EPA-approved SCREEN3 air dispersion model. Emission sources for the construction site were modeled as a distributed area source over the laydown area with an effective plume height of 0.75 meters (m). Dust emissions were modeled as a single-area source that covered the total laydown site. Other assumptions used in the model include:

- Exhaust emissions from construction equipment and other mobile sources are modeled as area sources, assumed to be evenly dispersed throughout the laydown area at an elevation of 2.5 ft from the surface.
- All construction activities occur during daylight hours.
- A worst-case atmospheric stability of neutral (Pasquill Gifford stability category D) is assumed.
- A wind speed of 13 mph (equivalent to the average wind speed for Class 5 wind energy).

- All construction activities occur simultaneously and all construction equipment is active at the same time, producing the maximum worst-case daily emissions.
- The closest off-site receptors are mining stakes, located no closer than 500 m to the proposed laydown areas.

The data presented in Table 3-8 (p. 3-48) outlines the established ambient air quality background levels.

Modeling Results—To convert the 1-hour maximum pollutant concentrations obtained from the SCREEN3 model into concentrations that reflect the averaging times for the ambient air quality standards, the scaling factors provided by EPA were used. The factors are 0.9 to convert to a 3-hour concentration, 0.7 to convert to an 8-hour concentration, 0.4 for 24-hour concentration, and 0.08 for annual averaging times. Maximum air quality impacts resulting from construction of the WGF at the closest off-site receptors (500 m) are provided in Table 4-7 (p. 4-22).

Summary of Construction Impacts. No adverse impacts on air quality are anticipated from construction of the WGF. Emissions and dust would be generated from vehicles and construction equipment adjacent to the WTGs, along roadways, and at ancillary facilities. These temporary and localized emissions would be considered negligible with the implementation of appropriate mitigation measures.

4.8.1.2 Operational Impacts

The production of electrical energy from wind power can improve regional air quality by the displacement of fossil-fueled generation plants. Unlike fossil-fueled plants, operation of the proposed WGF would result in no emissions of NO_x, SO_2, CO, VOCs, carbon dioxide (CO_2), or PM_{10}. A very minor amount of VOCs can potentially be emitted from the cooling and lubrication fluids during routine material transfer and maintenance activities. Overall, impacts on air quality with the implementation of the Proposed Action would be beneficial, resulting in no additional air pollution emissions due to fossil-fuel burning for electricity generation.

Table 4-7. Modeled Maximum Construction Impacts.

Pollutant	Averaging Time	Maximum Construction Impacts (μg/m³)	Background Concentration (μg/m³)	Total Impact (μg/m³)	State Standard (μg/m³)	Federal Standard (μg/m³)
	24-hour	6.4	93	99.4	150	150
PM_{10}	Annual mean	1.3	16	17.3	50	50
NO_2	Annual mean	65	18.8	84	100	100
CO	1-hour	1,047	3,894	4,941	40,000	40,000
	8-hour (<5,000 ft)	733	2,405	3,138	10,000	10,000
	8-hour (>5,000 ft)	733	2,405	3,138	6,670	NA
SO_2	24-hour	9.0	52.3	61.3	365	365
	Annual mean	1.8	0.03	1.83	80	80

4.8.2 Alternative A

The impacts on climate and air quality under Alternative A would be slightly greater than the impacts associated with the Proposed Action. One hundred and two more trucks would be required to haul parts and WTGs to the proposed WTG sites. It is assumed that construction of the additional WTGs would take the same amount of time as the Proposed Action since the WTGs in Alternative A are smaller and can be constructed more quickly. Impacts on the climate and air quality from implementing Alternative A would be similar to the Proposed Action and would not be significant with appropriate dust control measures. Operational impacts of Alternative A would be beneficial to air quality.

4.8.3 Alternative B

The impacts on climate and air quality under Alternative B would be slightly less than the impacts associated with the Proposed Action. Fewer truck trips would be required to haul WTGs and parts to the site. It is assumed that construction of the fewer, but larger, WTGs would take the same amount of time as the Proposed Action. Impacts on the climate and air quality from implementing Alternative B would be similar to the Proposed Action and would not be significant with appropriate dust control measures. Operational impacts of Alternative B would be beneficial to air quality.

4.8.4 No-Action Alternative

Under the No-Action Alternative, there would be no issuance of ROW grants and the proposed project would not be built. Therefore, there would be no beneficial impacts related to climate and air quality, such as the decrease in the emission of air pollutants.

4.9 Visual Resources

For the purposes of this EIS, impacts on visual resources would be considered significant if they resulted in any of the following:

- A conflict with VRM objective and management directives as identified in the RMP
- A visual nuisance or a substantial degradation of the visual aesthetics of the area
- A substantial interference with dark-sky activities.

4.9.1 Proposed Action

Where applicable, an analysis of the environmental consequences of the Proposed Action was conducted pursuant to the BLM VRM contrast rating system (BLM 1986). The contrast rating system is a systematic process used to analyze the potential visual impact of proposed activities. The contrast rating system is based on the concept that the degree to which a certain activity affects the visual quality of a landscape depends on the visual contrast created between that activity and the existing landscape. The contrast can be measured by comparing the project features with the major features in the existing landscape. The basic design elements of form, line, color, and texture are used to make this comparison and to describe the visual contrast created by the project. This assessment process provides a means for determining visual impacts and for identifying measures to mitigate these impacts.

4.9.1.1 Key Observation Points

Under the contrast rating system, the contrast rating is conducted from the most critical viewpoints, or key observation points (KOPs). Factors that were considered in selecting KOPs are angle of observation, number

4.8.2 Alternative A

[illegible]

4.8.3 Alternative B

[illegible]

4.8.4 No-Action Alternative

[illegible]

4.9 Visual Resources

[illegible]

- [illegible]
- [illegible]
- [illegible]

4.9.1 Proposed Action

[illegible] comparing the project features with the major features [illegible] the project. [illegible] measures to mitigate these impacts.

4.9.1.1 Key Observation Points

Under the [illegible] rating system, the [illegible] observation points (KOPs) [illegible] of viewers, length of time the project is in view, relative project size, season of use, and light conditions. Three KOPs were selected for the Proposed Action: the Jean interchange (KOP No. 1), the town of Goodsprings (KOP No. 2), and the community of Sandy Valley (KOP No. 3). The locations of the KOPs are illustrated in Figure 4-1 (p. 4-25). A description of the locations of these KOPs and the reasons for their selection are described below.

KOP No. 1 is located at the Jean interchange. The Jean interchange is located at the Junction of I-15 and SH 161. This location was selected as a critical viewpoint to represent the views from I-15, as well as the employees and visitors of the commercial developments at the Jean interchange.

KOP No. 2 is located at the town of Goodsprings. Goodsprings is located just off of SH 161 approximately 1 mi east of the area of the Proposed Action. This location was selected as a critical viewpoint to represent the views from the town of Goodsprings and of the westbound motorists of SH 161. The precise KOP location is at a high point at the northeastern edge of town. This location was selected because from within the majority of the town, the view of the area of the Proposed Action is obscured by hills that lie to the immediate west and southwest of the town. By selecting this location, the view from the KOP would represent the most affected view from the town of Goodsprings.

KOP No. 3 is located on the eastern edge of the community of Sandy Valley. The community of Sandy Valley is spread throughout Sandy Valley, which is the low-lying valley located along the Nevada/California state line to the west of the area of the Proposed Action. The KOP is located on the eastern edge of the community, on SH 161, near the easternmost residences of the valley. This location was selected as a critical viewpoint to represent the views of the residents and visitors of Sandy Valley, as well as the eastbound motorists of SH 161.

Several other locations were considered as potential KOPs. These locations, the reasons for their consideration, and the reasons why they were not used as KOPs are described below.

The Primm interchange, located on I-15 at the Nevada/California state line, was considered as a KOP that could represent views of I-15 motorists and Primm visitors. This location was not used for analysis because topography and distance concealed the area of the Proposed Action from sight.

Two additional locations along I-15 were considered as KOPs that could represent views of I-15 motorists. The locations were at the Mile 7 marker, halfway between Primm and Jean, and at the Mile 16 marker, about halfway between Jean and the State Highway 146 interchange. These locations were not used because the Jean interchange was selected as a KOP. The view from the Jean interchange is considered to represent the most affected view from I-15, and due to its selection as a KOP, it was concluded that it was not necessary to use other locations along I-15.

Two additional locations along SH 161 were also considered as KOPs to represent the views of motorists traveling through Columbia Pass between Goodsprings and Sandy Valley. One location was about halfway between Columbia Pass and Goodsprings (to represent the views of westbound motorists) and the other was located about halfway between Columbia Pass and Sandy Valley (to represent the views of eastbound motorists). These points were not selected because views of the area of the Proposed Action from these portions of SH 161 would be limited in duration, the number of motorists that travel this portion of SH 161 is classified as low-level use according to BLM VRM guidance, and KOPs were selected at Goodsprings and Sandy Valley that provide similar views. Locations within the RRCNCA and the Humbolt-Toiyabe National Forest were also considered as KOPs; however, investigation revealed that topography and distance would make the area of the Proposed Action unseen from these areas. Investigations also indicated that views from the nearest Wilderness Study Areas (WSAs), Pine Creek (approximately 7 mi to the north), North

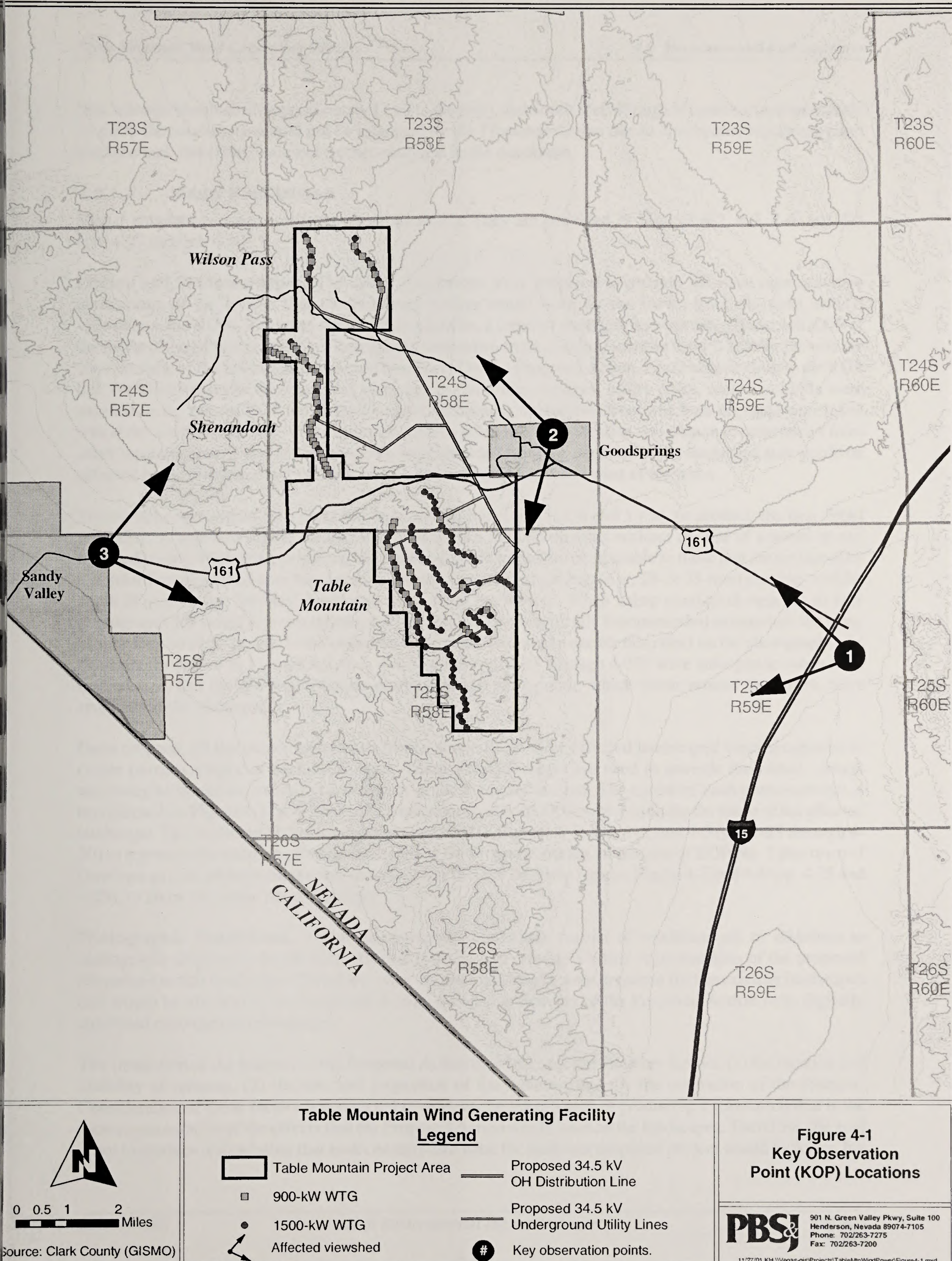


Figure 4-1
Key Observation Point (KOP) Locations

McCullough Mountains (approximately 17 mi to the east), and South McCullough Mountains (approximately 15 mi to the southeast), would not be impacted by the Proposed Action due to intervening topography and distance and, therefore, were not further analyzed in the document.

4.9.1.2 Visual Simulations

Visual simulations were conducted from all KOPs. They are provided as Figures 4-2, 4-3, 4-4, and 4-5 (pp. 4-27 through 4-30).

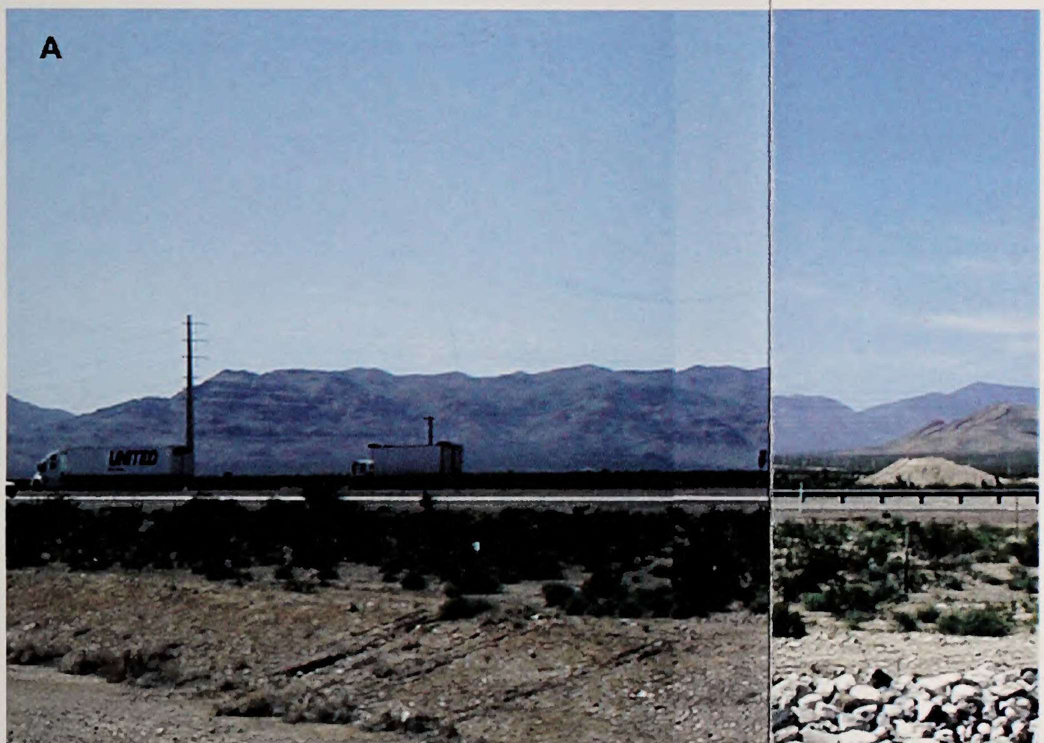
Photos and Photomontages. The visual simulations were prepared to provide the most representative simulations of the effects that the Proposed Action would have on the views from the most critical viewpoints, the KOPs. To create the visual simulations, a series of photographs were taken from each KOP of the entire affected landscape. The photographs were taken from selected locations at each KOP to provide the clearest view of the landscape that would be affected by the Proposed Action. Local objects close to the KOP that could obstruct the view, such as trees, trucks, buildings, bridges, utility poles, rocks, and hills were avoided. In the case of KOP No. 2 (the town of Goodspings), the location from which photographs were taken was at the southeastern edge of the town, on top of a small hill. This location was chosen because views from other locations within and around the town were shielded from the majority of the landscape that would be affected by the Proposed Action by a small ridgeline lying north and west of the town.

Photographs were taken on a clear day between the hours of 11 A.M and 1 P.M. to produce the best detail rendering. A standard digital camera was used to take the photographs without the use of a zoom or any attached lenses. With this equipment, the resulting photographs are comparable to those that are produced by a standard nondigital 35-mm-lens camera. The use of a wide-angle lens (e.g., 28- or 35-mm) provides a wider angle of vision, but "pushes" landforms away from the viewer. When using nondigital cameras to take photographs for visual representations, a 50- or 55-mm lens is typically recommended to maintain the same proportions on photographs as the ones seen in the field. To compensate for this effect on the photographs, the photographs shown in Figures 4-2, 4-3, 4-4, and 4-5 (pp. 4-27 through 4-30) were enlarged to twice their normal size, and the nonproportionate portions of the photograph, which occur around the edges, were cropped off the photograph.

Once cropped, all the photographs taken from a single KOP of the affected landscaped were juxtaposed to create photomontages of each KOP view. These photomontages are used to provide the visual context necessary to assess the overall visual impact of the Proposed Action. The extent of each photomontage is represented on Figure 4-1 (p. 4-25) by the arrows drawn at each KOP, which indicate the range of the affected landscape. The unaltered photomontages are included in Figures 4-2, 4-3, 4-4, and 4-5 (pp. 4-27 through 4-30) to represent the existing affected landscape of the Proposed Action. In the case of KOP No. 2 (the town of Goodspings), the photomontage was so wide it was divided onto two figures, Figure 4-3 and 4-4 (pp. 4-28 and 4-29), to show the entire photomontage.

Photographic Simulations. Visual photographic simulations consist of modifications or additions to photographs displaying the existing affected landscape to provide a visual representation of the proposed alterations to that landscape. Therefore, once the photomontages were prepared for the existing landscapes that would be affected by the Proposed Action, the visible features of the Proposed Action were digitally simulated onto the photomontages.

The simulation of the features of the Proposed Action took into account three key factors: (1) the location and visibility of features, (2) the size and proportion of the features, and (3) the coloration of the features. Consideration of these factors is conducted to achieve the overall goal of producing a simulation that is the most representative of the effects that the Proposed Action would have on the landscapes. Therefore, the goal is not to produce a simulation that looks exactly like what the built-out proposed project would look like, but



(A) Panoramic photograph of the existing area of the Proposed Action, looking west from the Jean Key Observation Point (KOP No. 1). See Figure 4-1.

(B) Conceptual photo-simulation of the Proposed Action.

Note: The photographs used for this exhibit were taken April 17, 2001, between 11AM and 1PM with a digital camera equivalent to a standard 35-mm camera. The photograph and photo-simulation are magnified by a factor of 2 for this figure to present a more accurate scale of real conditions.

Source: PBS&J

Figure 4-2
Jean Key Observation Point Simulation - Looking Westward

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Henderson, Nevada 89074-7105
Phone: 702/263-7275
Fax: 702/263-7200

11/27/01 KH \\Vegas-gis\Projects\TableMtnWindPower\Figure4-2.mxd

McCulloch [illegible] Figure [illegible] and [illegible] [illegible]

4.8.12 Visual Simulations

Visual simulations [illegible] (pp. 4-27 through [illegible])

Photos and Photomontages. [illegible]

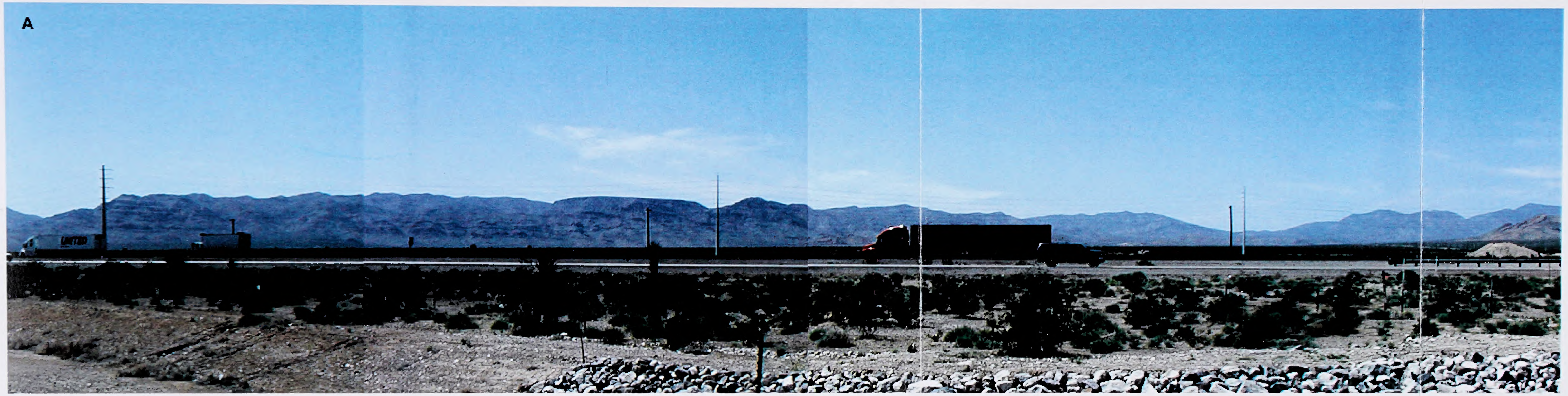
Photographs were taken [illegible]

[illegible]

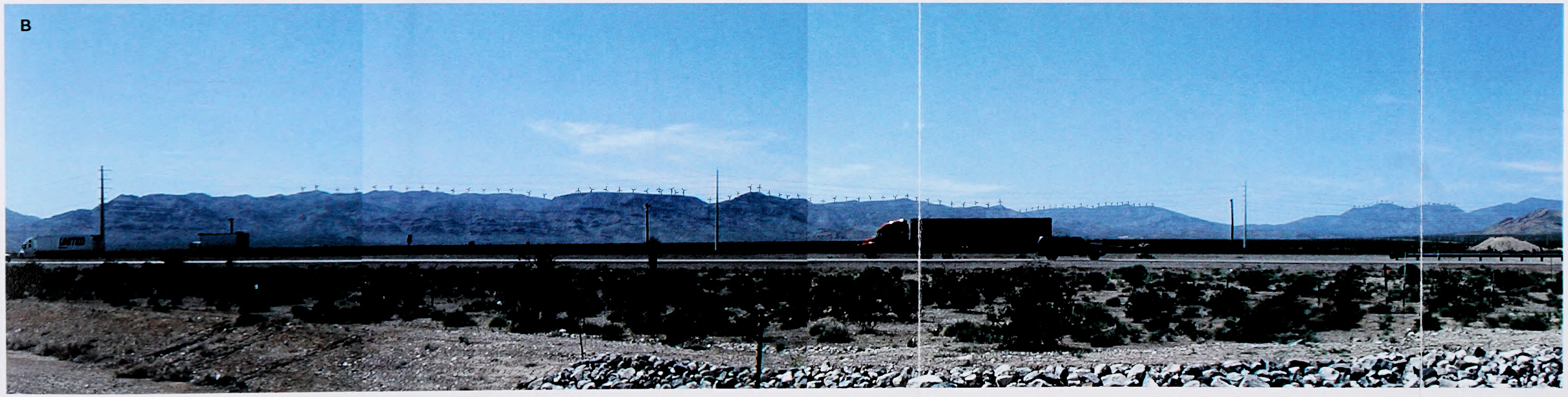
Photographic Limitations. [illegible]

[illegible]

A



B



(A) Panoramic photograph of the existing area of the Proposed Action, looking west from the Jean Key Observation Point (KOP No. 1). See Figure 4-1.

(B) Conceptual photo-simulation of the Proposed Action.

Note: The photographs used for this exhibit were taken April 17, 2001, between 11AM and 1PM with a digital camera equivalent to a standard 35-mm camera. The photograph and photo-simulation are magnified by a factor of 2 for this figure to present a more accurate scale of real conditions.

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Figure 4-2
Jean Key Observation Point Simulation - Looking Westward

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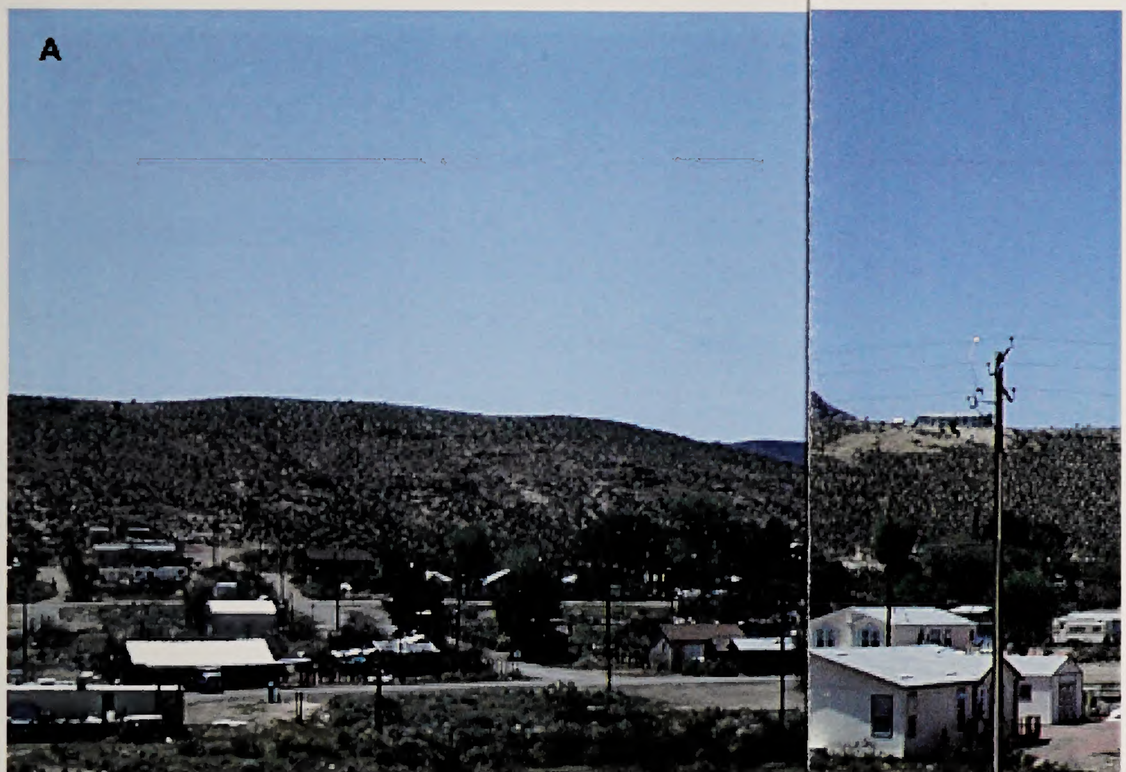
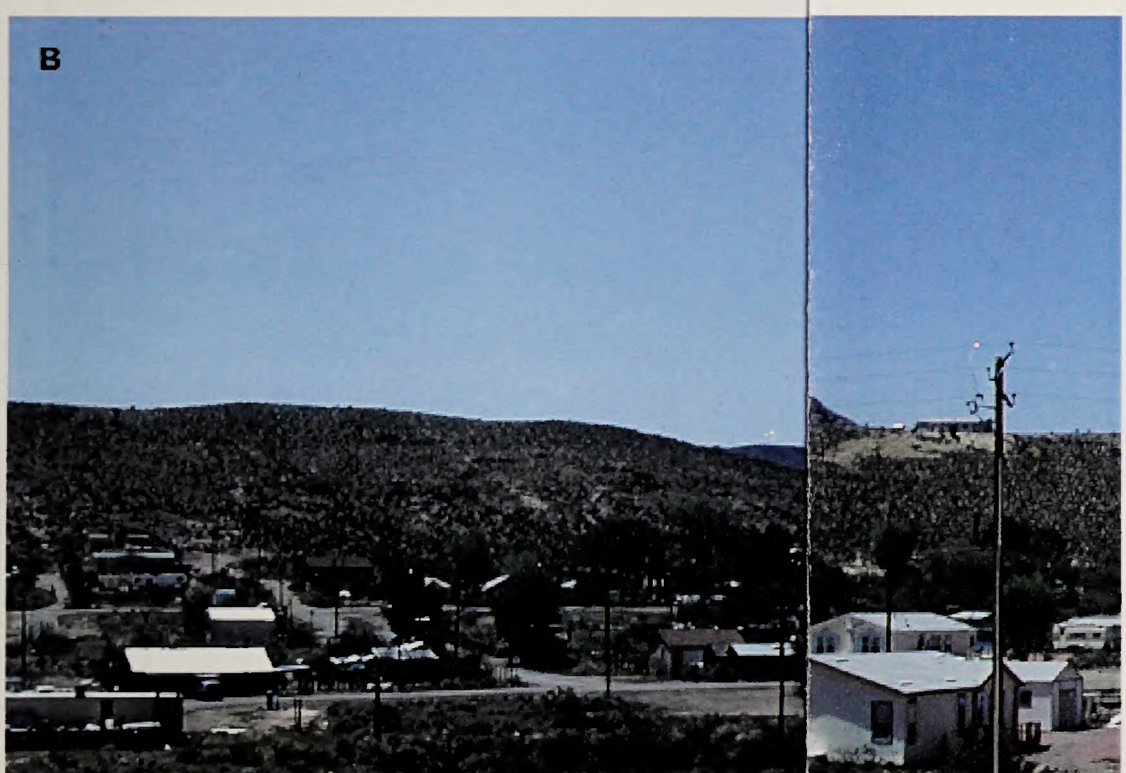
11/27/01 KH \\Vegas-gis\Projects\TableMtnWindPower\Figure4-2.mxd





Match to Figure 4-4

(A) Panoramic photograph of the existing area of the Proposed Action, looking southwest from the Goodsprings Key Observation Point (KOP No. 2). See Figure 4-1.

(B) Conceptual photo-simulation of the Proposed Action.

Note: The photographs used for this exhibit were taken April 17, 2001, between 11 AM and 1PM with a digital camera equivalent to a standard 35-mm camera. The photograph and photo-simulation are magnified by a factor of 2 for this figure to present a more accurate scale of real conditions.

Source: PBS&J

Figure 4-3
Goodsprings Key Observation Point Simulation - Looking Southwestward

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Phone: 702/263-7275
Fax: 702/263-7200

A

B

Match to Figure 4-4

(A) Panoramic photograph of the existing area of the Proposed Action, looking southwest from the Goodsprings Key Observation Point (KOP No. 2). See Figure 4-1.

(B) Conceptual photo-simulation of the Proposed Action.

Note: The photographs used for this exhibit were taken April 17, 2001, between 11 AM and 1PM with a digital camera equivalent to a standard 35-mm camera. The photograph and photo-simulation are magnified by a factor of 2 for this figure to present a more accurate scale of real conditions.

Source: PBS&J

Figure 4-3
Goodsprings Key Observation Point Simulation - Looking Southwestward

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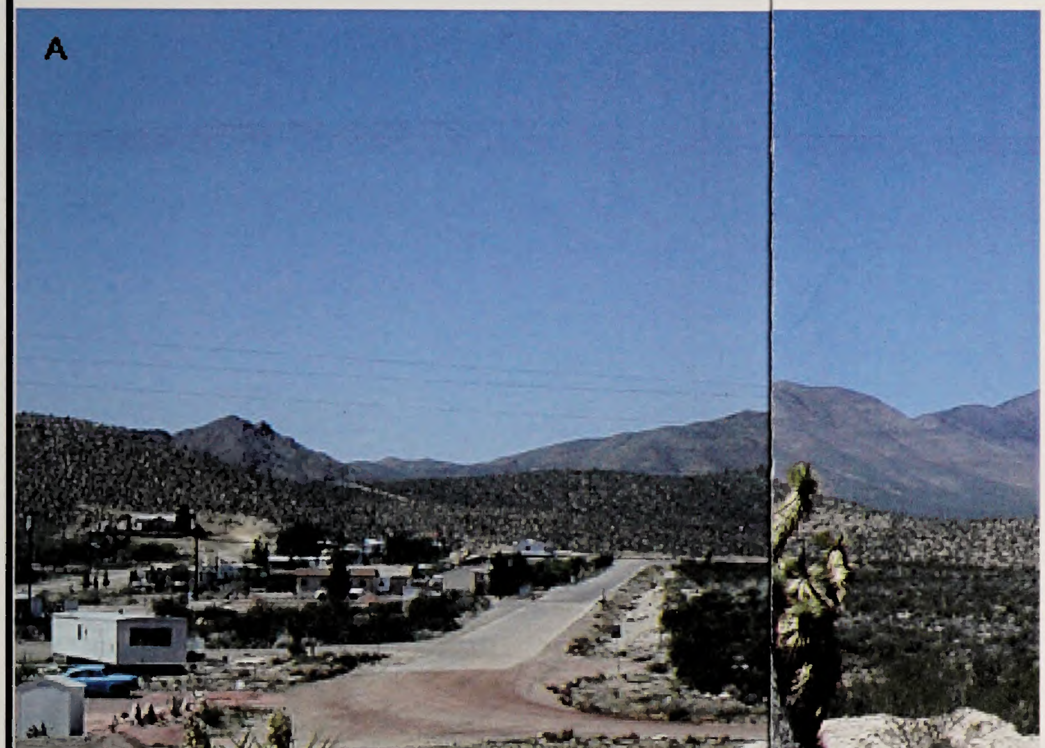
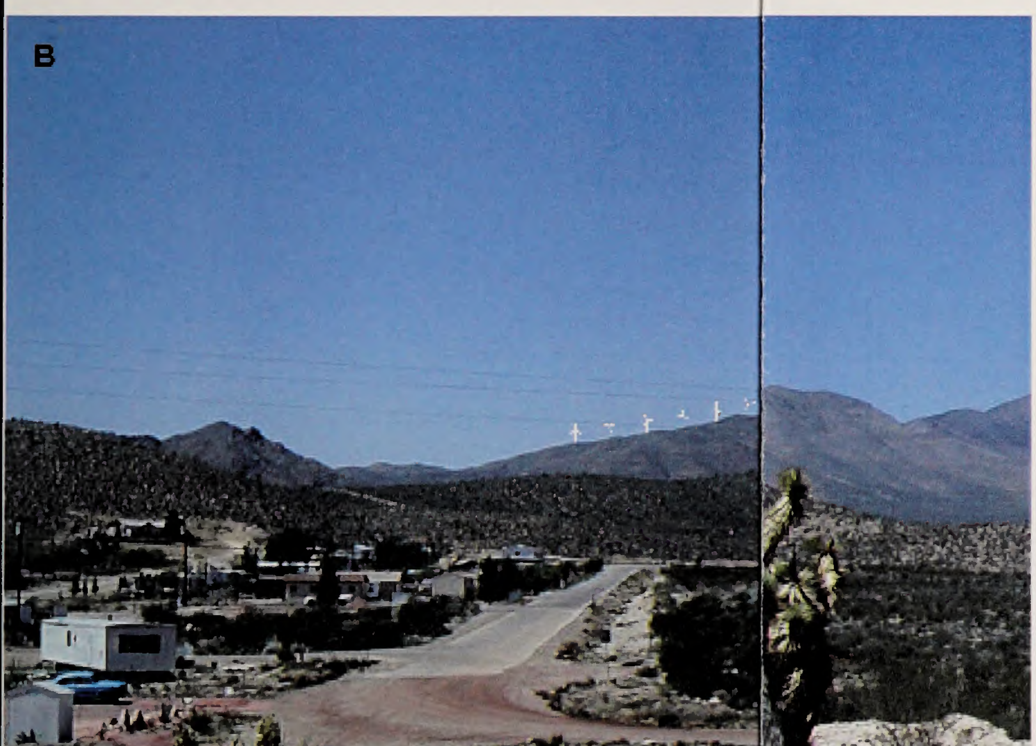
11/27/01 KH \\Vegas-gis\Projects\TableMtnWindPower\Figure4-3.mxd

MATCH WITH FIGURE 3-14-4(a)

Match to Figure 4-3





MATCH WITH FIGURE 3-14-4(a)

(A) Panoramic photograph of the existing area of the Proposed Action, looking west and northwestward from the Goodsprings Key Observation Point (KOP No. 2). See Figure 4-1.

(B) Conceptual photo-simulation of the Proposed Action.

Note: The photographs used for this exhibit were taken April 17, 2001, between 11AM and 1PM with a digital camera equivalent to a standard 35-mm camera. The photograph and photo-simulation are magnified by a factor of 2 for this figure to present a more accurate scale of real conditions.

Source: PBS&J

Figure 4-4
Goodsprings Key Observation Point Simulation - Looking Westward and Northwestward

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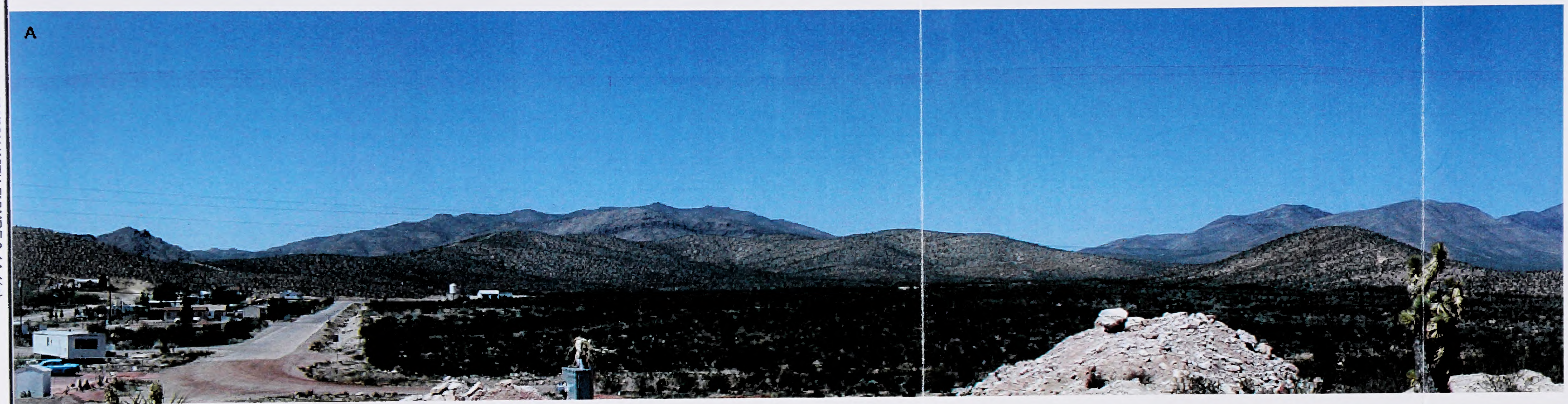
11/27/01 KH \\Vegas-gis\Projects\TableMtnWindPower\Figure4-4.mxd

MATCH WITH FIGURE 3-14-4(a)

Match to Figure 4-3



MATCH WITH FIGURE 3-14-4(a)

(A) Panoramic photograph of the existing area of the Proposed Action, looking west and northwestward from the Goodsprings Key Observation Point (KOP No. 2). See Figure 4-1.

(B) Conceptual photo-simulation of the Proposed Action.

Note: The photographs used for this exhibit were taken April 17, 2001, between 11AM and 1PM with a digital camera equivalent to a standard 35-mm camera. The photograph and photo-simulation are magnified by a factor of 2 for this figure to present a more accurate scale of real conditions.

Source: PBS&J

Figure 4-4
Goodsprings Key Observation Point Simulation - Looking Westward and Northwestward

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11/27/01 KH \\Vegas-gis\Projects\TableMtnWindPower\Figure4-4.mxd

(A) Panoramic photograph of the existing area of the Proposed Action, looking east from the Sandy Valley Key Observation Point (KOP No. 3). See Figure 4-1.

(B) Conceptual photo-simulation of the Proposed Action.

Note: The photographs used for this exhibit were taken April 17, 2001, between 11AM and 1PM with a digital camera equivalent to a standard 35-mm camera. The photograph and photo-simulation are magnified by a factor of 2 for this figure to present a more accurate scale of real conditions.

Source: PBS&J

Figure 4-5
Sandy Valley Key Observation Point Simulation - Looking Eastward

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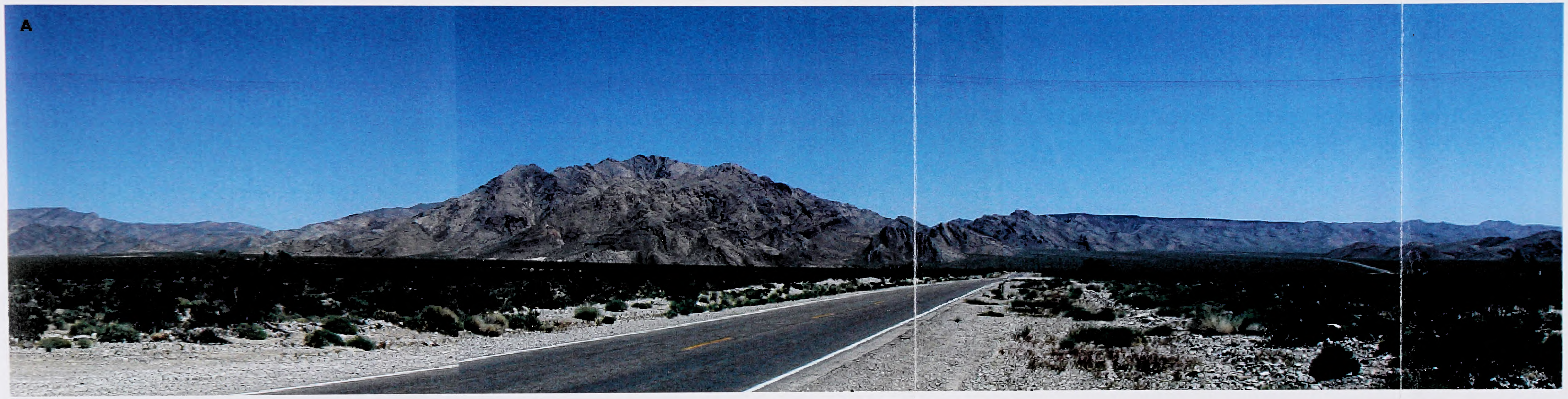
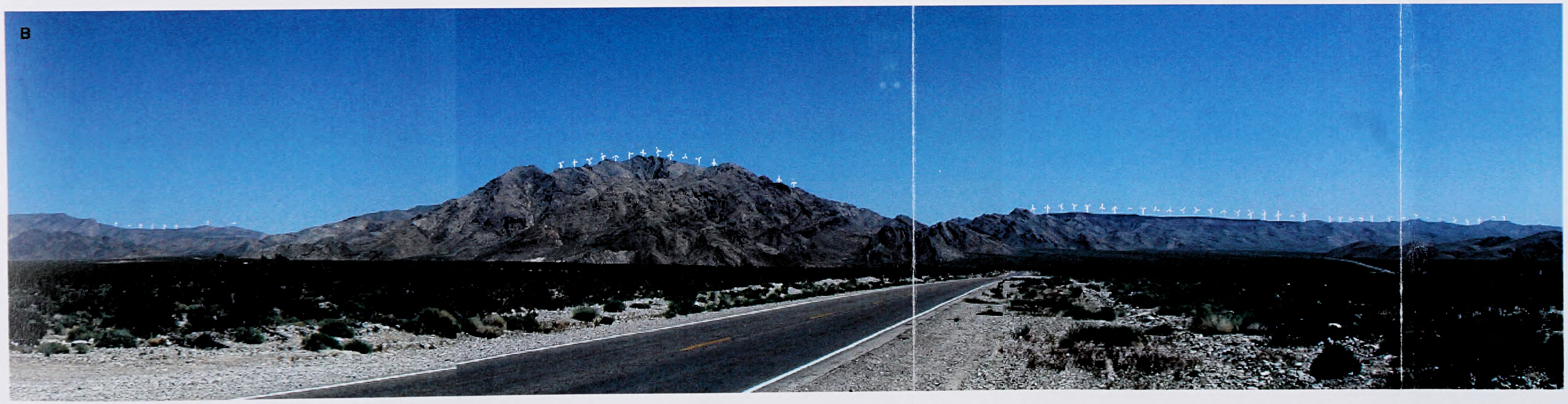
Phone: 702/263-7275
Fax: 702/263-7200

11/27/01 KH \\Vegas-gis\Projects\TableMtnWindPower\Figure4-5.mxd

A



B



(A) Panoramic photograph of the existing area of the Proposed Action, looking east from the Sandy Valley Key Observation Point (KOP No. 3). See Figure 4-1.

(B) Conceptual photo-simulation of the Proposed Action.

Note: The photographs used for this exhibit were taken April 17, 2001, between 11AM and 1PM with a digital camera equivalent to a standard 35-mm camera. The photograph and photo-simulation are magnified by a factor of 2 for this figure to present a more accurate scale of real conditions.

Source: PBS&J

Figure 4-5
Sandy Valley Key Observation Point Simulation - Looking Eastward

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11/27/01 KH \\Vegas-gis\Projects\TableMtnWindPower\Figure4-5.mxd

instead, to produce a simulation that best illustrates the changes that the proposed project would have on the landscape. The following paragraphs describe the processes involved in the consideration of each of these factors.

Location and Visibility of Simulated Features—The location and visibility of the features of the Proposed Action, in relation to each KOP, were determined through an analysis of the Proposed Action Facilities Site Plan, the description of the components of the Proposed Action, and the topography of the site and surrounding area. For the purpose of the simulations, the Proposed Action Facilities Site Plan (Figure 2-2, p. 2-6) was used as the reference for the proposed locations of the different components of the Proposed Action. To represent the greatest alteration that could occur, all WTGs were evaluated and illustrated as the NM72C (or comparable manufacturer and type) WTGs, which consist of a three-blade rotor, approximately 280 ft in diameter, mounted on an approximately 290-ft-high tower.

The approximate locations of proposed structures were determined for the simulation through a comparison of the photomontages and detailed topographic maps illustrating the components of the Proposed Action. Select natural features and landmarks were identified in the photomontages and then located on the topographic map. To determine the visibility of the proposed features of the Proposed Action from the KOP, topography was taken into consideration between the KOP and the location of the Proposed Action component. In some circumstances, sight line plots were prepared to assist in determining the visibility of certain features. As an example, sight line plots revealed that due to topography, the WTGs located on top of the Table Mountain mesa would be shielded by the edge of the mesa closest to the KOP. Therefore, only those WTGs located in front of the mesa or on the closest edge of the mesa would be fully visible. Those WTGs located on top of the mesa would become decreasingly visible the farther they are located from that edge of the mesa until they were entirely shielded by the near edge of the mesa.

The proposed substation would not be visible from any of the KOPs, and the proposed distribution lines and the proposed new and improved roads would be only minimally visible from the KOPs. For the most part, it was concluded that the new and improved roads would be shielded from the KOPs by the topography, as can be seen with the existing roads that are only minimally visible in the photomontages.

Size and Proportion of Simulated Features—The size and proportion of the Proposed Action components that were added to the simulations to illustrate the changes to the affected landscape were determined primarily by analyzing the heights of certain topographic features in the photomontages that are comparable in height and location to the proposed feature. For the WTGs, proportional drawings were developed and added to the simulations. The degradation of detail of the WTG drawings was compensated for by exaggerating the simulated WTG in height and in width. (The degradation in detail is a by-product of a digital photosimulation, where the detail of a simulated structure can become blurred and faded due to resolution limitations caused by file size and printing-capability constraints.) Exaggerating the size of the WTGs was necessary because they are shown at such a great distance from the KOP that their size in the photosimulations is very small. Without exaggeration, the size of the simulated structures would be faded and blended into the background, thereby making them barely visible and providing a poor representation of the impact they would have on the landscape.

Color of Simulated Features—Color was selected for the simulated proposed features based on the approximate color of the Proposed Action component. For the WTGs, it was assumed that a light color, either white, an off-white, or a light gray, would be used to paint the WTGs. In the simulation for KOP No. 1 (Figure 4-2, p. 4-27), a medium gray was selected for the WTGs based on the assumed color and the presentation. A white or light gray would have been preferred for consistency with the other simulations; however, the backdrop to the simulated WTGs in Figure 4-2 (p. 4-27) is very light, and using a lighter color would not produce enough contrast to provide an acceptable presentation of the impact that the WTGs would have on the skyline. The selection of a medium gray is also supported because of the distance between the

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KOP and the simulated structures. At greater distances color becomes less identifiable to a viewer and less important in a simulation. For KOP Nos. 2 and 3, the distances were shorter and a sufficient contrast was achieved using white as the color for the WTGs. The use of light or medium gray for the WTGs in the simulations for KOP Nos. 2 and 3 resulted in less contrast than the white, and therefore, white was selected for use in those simulations.

4.9.1.3 Visual Contrast Rating

Visual contrast ratings were developed for all the KOPs in accordance with the Visual Resource Contrast Rating, BLM Manual Handbook 8431-1 (BLM 1986). Worksheets used for the visual contrast ratings are provided in Appendix H. Under the VRM visual contrast rating system, the features of an activity under analysis are categorized as landforms/water, vegetation, or structures. Degree of contrast is then calculated for four basic elements of a landscape (form, line, color, and texture) for each of the categories. Four degrees of contrast are used to rate the landscape elements. These degrees of contrast are:

- 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 Proposed Action contains features that fall under two categories: landforms/water and structures. The Proposed Action does not involve large-scale planting or vegetative alteration and therefore contains no features that fall under the vegetation category. The features of the Proposed Action that are assigned to the landforms/water category include roads, building pads, and staging areas. The features of the Proposed Action that are assigned to the structures category include wind turbines, transmission lines, and substations. The expected visual characteristics of these features of the Proposed Action are presented in Table 4-8 (p. 4-33).

Based on these characteristics, the visual contrast ratings for the Proposed Action were developed. The visual contrast ratings for the three KOPs are presented in Table 4-9 (p. 4-33). Based on Table 4-9 (p. 4-33), VRM objectives that apply to the area of the Proposed Action would not be met. In the case of KOP Nos. 2 and 3, the development of the Proposed Action would introduce a strong vertical element into the landscape. The turbines would create strong contrasts in the form and line of the landforms, and the uniformity of the turbines would result in a strong contrast with the texture of the landscape. The strong contrast at these KOPs resulting from the Proposed Action would be inconsistent with both Class II and Class III objectives and management directives, which respectively call for low and moderate alteration to the landscape. In addition, when in operation, the blades of the WTGs would be in motion. The motion of the blades would add to the visibility of the project and would attract the attention of a viewer. This characteristic would not be consistent with the Class II objective, which states that activities should not attract the attention of the casual observer, but in this regard, it may be consistent with the Class III objective, which states that the activity may attract attention but should not dominate the view.

Other effects the Proposed Action would have on the landscape at KOP Nos. 2 and 3 would be weak or none. Color would result in a weak contrast due to distance and atmospheric conditions. At these locations, the landform features of the Proposed Action would be weak. This is primarily because the building pads would be unseen due to topography and the landform alterations associated with the improvement of roads and the creation of new roads for access to the Proposed Action are anticipated to be hidden from the KOPs due to topography and road locations.

Table 4-8. Visual Characteristics of the Proposed Action.

	Proposed Action Feature		
Element	**Landform/Water**	**Vegetation**	**Structures**
Form	Horizontal (pads) Curving (roads)	None	Linear/vertical/narrow
Line	Bold/curving	None	Regular/vertical
Color	Brown/tan	None	White/off-white
Texture	Smooth/continuous	None	Ordered/dotted

Table 4-9. Visual Contrast Ratings for KOP Nos. 1, 2, and 3.

		Proposed Action Feature		
Key Observation Point	**Element**	**Landform/Water**	**Vegetation**	**Structures**
KOP No. 1 – Jean interchange	Form	None	None	Weak
	Line	None	None	Moderate
	Color	None	None	Weak
	Texture	None	None	Moderate
KOP No. 2 – Goodsprings	Form	Weak	None	Strong
	Line	Weak	None	Strong
	Color	Weak	None	Weak
	Texture	None	None	Strong
KOP No. 3 – Sandy Valley	Form	Weak	None	Strong
	Line	Weak	None	Strong
	Color	Weak	None	Weak
	Texture	None	None	Strong

At KOP No. 1, all impacts would be reduced because of the increased distance from the area of the Proposed Action. It was determined at this point that all features of the Proposed Action would result in a contrast of weak to none, except for the turbines contrasting with the skyline and the texture of the landscape. A moderate contrast rating would be consistent with the objectives of a Class III area, but would be inconsistent with the objectives of a Class II area.

Based on the above analysis, it was concluded that the Proposed Action would result in a significant impact on the visual resources of the project site and surrounding area.

4.9.1.4 Lighting and Dark-Sky Impacts

The structures of the Proposed Action would require lighting for maintenance, security, and safety. Lighting would be provided on each WTG and at the substation. Lighting would also be required by the FAA for air traffic safety as described in Section 2.2.3.

Lighting can result in a variety of impacts. Glare is direct light shining from a fixture (luminaire) or the reflection of light off of a surface that makes it difficult to see or causes discomfort. It is especially a problem

for motorists. Light trespass describes the impacts of shining light onto neighboring properties when that light is intrusive or objectionable. Sky glow refers to the impact of the composite illumination coming from towns, cities, and other developed areas. It is the yellowish glow visible in the sky when looking from a relatively dark area toward a nearby town or city. All of these impacts can degrade the visual quality of an area. They can also affect dark-sky activities such as recreational and scientific space observation.

Based on the surrounding area, it was concluded that the Proposed Action would not contribute substantially to sky glow. The City of Las Vegas is located approximately 20 mi to the northeast of the Proposed Action, and the impacts of the city's lighting on the dark sky substantially exceed the amount of impact that the Proposed Action would contribute.

The Proposed Action is not anticipated to result in light trespass of the residences in the areas surrounding the Proposed Action. For the Proposed Action to result in the illumination of the properties of the residences in Goodsprings or Sandy Valley, the lighting of the Proposed Action would be required to be extremely high powered and directed toward those properties.

Because a lighting plan has not yet been developed for the Proposed Action, there is a potential for the glare from direct lighting or the reflection of lighting off of turbines to impact (visual distraction) the views of motorists and the surrounding residents. Mitigation measures are described in Chapter 5 that would ensure that impacts from glare are not significant.

As discussed in Section 2.2.3, it is anticipated that air traffic safety lighting would consist of medium-intensity white lights flashing during the day and twilight and red beacons flashing during the night. The use of such lights is common for structures exceeding 200 ft in height. During the daytime, these lights are not anticipated to distract drivers or attract any more attention than the turbines themselves. At night, the lights will be apparent from the surrounding areas and will detract from the aesthetics of the night sky for those areas. However, as with the daytime lights, the same and similar flashing lights are typical along most roads throughout the United States, and they are not anticipated to create an abnormal distraction to drivers or produce other safety concerns.

4.9.1.5 Additional Visual Impacts

Although other project components would not substantially affect the views from the KOPs, they would have some minimal and localized impacts. These components include the proposed substation, the proposed road improvements and new roads, the proposed meteorological towers, and the proposed distribution lines.

Substation Impacts. The proposed substation would be located adjacent to SH 161 east of Table Mountain. Although not visible from the town of Goodsprings, the substation would be visible from various locations along SH 161. For eastbound travelers, the substation would be partially visible for a length of road just west of the turnoff to the town of Goodsprings and then for a portion of the road starting a short distance after the turnoff and continuing to the proposed location of the substation. For westbound travelers, the proposed substation would be visible just after leaving the pass between Table Mountain and Shenandoah Peak until reaching the proposed location of the substation.

There are currently plans for the construction of two residential properties near the intersection of Sandy Valley Road and SH 161 that will have a view of the substation. The proposed substation would be located on an eastward sloping, relatively undisturbed portion of desert. The view affected by the proposed substation for westbound travelers would be that of Table Mountain, and for eastbound travelers, the affected view would be of the valley, which extends down to I-15, the town of Jean, and beyond. The proposed substation would introduce a weakly contrasting element to these views. The substation would substantially contrast with the immediate surrounding lands, but because the substation would not affect any major lines of the landscape (such as a ridgeline) and would only affect a small portion of a much larger landscape, the contrast is

considered weak. Furthermore, the use of SH 161 and the surrounding area is low, and the affected landscapes do not posses any special significance. Therefore, the visual impacts resulting from the proposed substation are not anticipated to be significant.

Road Improvement and New Road Impacts. Road improvements and new roads are proposed throughout the project area. These types of activities affect the visual aesthetics of a landscape by dissecting continuous forms, introducing a new color to the landscape, and creating lines that do not match those of the affected landscape. Improvements and new roads constructed on the top of the Table Mountain and Shenandoah Peak ridgelines would not be visible or would only be minimally visible from the surrounding area and therefore would have minimal impacts. The more substantial impacts from improved and new roads would occur along the proposed roads that are used to access Table Mountain, Shenandoah Peak, and the Potosi Mountain area. The roads leading to the Wilson Pass area could potentially be the most visible because the hillside location of the proposed WTGs is fairly visible from many of the surrounding areas. Although these areas include portions of SH 161 and Wilson Pass Road, they are relatively low-use areas and are fairly distant from the location of the proposed roads, except for those portions of Wilson Pass Road that are adjacent to the proposed Potosi Mountain WTG site. The road leading to Shenandoah Peak would be the second most visible of the access roads, as it would be visible along portions of SH 161 between the town of Goodsprings and Columbia Pass, as well as from the low-lying area to the north of SH 161 in this area. The access road to Table Mountain from SH 161 would be the least visible of all the access roads, since it would only be visible from a small portion of SH 161.

Although road improvements and construction could substantially impact landscapes throughout the project area, these impacts are not considered significant for the following reasons:

- All the areas are relatively low-use areas.
- The areas affected by the proposed improvements and new roads are relatively small.
- The affected landscapes are not identified as possessing special significance.
- The impacts would not be visible to any critical viewpoints.

Regardless of how significant the impacts are, however, visual impacts should be minimized to the extent possible. Mitigation measures are included for visual impacts from road improvements and construction of new roads in Section 5.9.

Meteorological Tower Impacts. The proposed meteorological towers would be approximately one-third the height of the larger of the proposed WTGs and would be only 3 ft in diameter. It is anticipated they would be barely visible from any location surrounding the WTG sites, and by themselves, they would not substantially affect any landscapes. Once the WTGs are constructed in the areas of the proposed meteorological towers, it is likely the meteorological towers would be undistinguished. Therefore, the proposed meteorological towers are not expected to result in any significant visual impacts.

Distribution Line Impacts. As with roads, proposed distribution lines are located throughout the proposed project site. The visual impacts associated with underground lines consist of land disturbance during construction and scarring from land disturbance. These impacts are anticipated to be minimal and would occur in areas with extremely limited use and visibility. Overhead distribution lines have a greater potential to affect visual aesthetics. Visual impacts associated with overhead distribution lines include those associated with underground lines and the introduction of structures to the landscape. The longest section of proposed overhead distribution line would parallel an existing power line, running from Wilson Pass to the proposed substation adjacent to SH 161. Therefore, for this portion of the proposed distribution line, alterations to the

exiting landscape would be greatly reduced and impacts would be minimal. In addition, many other sections of proposed overhead distribution line would be along existing dirt roads or collocated with proposed roads, which also reduces the alterations to existing landscapes and minimizes impacts. Distribution lines are only proposed in two areas where no other disturbance already exists or is proposed. These two locations are on the eastern side of Table Mountain. The development in these areas would affect the views of the Table Mountain landscape, primarily from portions of SH 161. However, the proposed line would be located in front of the Table Mountain backdrop, and the distribution line itself would be fairly small. From a distance, the line would be barely visible, and from closer areas, the line would have only minimal contrast. All visual impacts associated with the proposed distribution lines are anticipated to be minimal and not significant.

4.9.2 Alternative A

The impacts on visual resources under Alternative A would be slightly greater than the impacts associated with the Proposed Action. This alternative would result in 22% more WTGs constructed in the project area. Impacts on visual resources from Alternative A would be significant.

4.9.3 Alternative B

The impacts on visual resources under Alternative B would be greater than for the proposed action since all WTGs would be considerably taller and more visible to KOPs. Although 12% fewer turbines would be constructed under this Alternative, their increased height would contributes to their greater visibility. Impacts on visual resources associated with the implementation of Alternative B would also be significant.

4.9.4 No-Action Alternative

Under the No-Action Alternative, there would be no approval of ROW applications and the proposed project would not be built. There would be no impacts related to visual resources.

4.10 Noise

For the purposes of this EIS, noise impacts would be considered significant if noise level increases, caused by construction and operation activities would adversely affect noise-sensitive receptors. Typical noise limits in industrial and agricultural areas require stationary sources to meet an average level of 70 to 80 dB(A)

4.10.1 Proposed Action

4.10.1.1 Construction Noise Impacts

The construction of the power plant would cause temporary elevations in noise levels in the immediate vicinity of the construction site. As discussed in Chapter 2, construction is scheduled over an 8-month period. Possible noise sources resulting from construction include additional heavy-truck traffic, trenching operations needed to install communications cables and transmission lines, and operation of the concrete batch plants that would produce the concrete needed for the windmill foundations. These temporary noise impacts are not considered significant.

4.10.1.2 Wind Turbine Operational Noise Impacts

Sound emissions from wind turbines have three different origins: mechanical noise, aerodynamic noise, and vibration. Mechanical noise from metal components moving or knocking against each other may originate in the gearbox, in the drive train (the shafts), or in the generator of a wind turbine. Recent gearbox designs for wind turbines are designed for quiet operation by using steel wheels in the gear box that have a semisoft flexible core, but a hard surface to ensure strength and longevity (DWIA 2001).

Aerodynamic-related noise is another special consideration in designing wind turbines for wind farms. The rotor blades act as membranes that retransmit noise and vibrations from the nacelle and tower. Rotor blades make a slight swishing sound when rotating at relatively low speeds. Rotor blades must break the wind to transfer energy to the rotor. This process creates white noise. Since the surfaces of the rotor blades are very smooth, they emit only a minor part of the noise. Most of the noise originates from the trailing (back) edge of the blades. It is routine practice in the WGF industry to carefully design the trailing edges of the rotor blades and to ensure careful handling of the rotor blades when they are mounted. Modern wind turbines are designed with large rotor diameters that have very low rotational speeds. Efficient power generation is achieved at these low rotational speeds, thereby reducing noise impacts that would result from higher rotational speeds.

Vibration-reducing features are incorporated into the design of the WGF. Turbine manufacturers now model WTGs using computers before building them. Results from the model help engineers design the wind turbines to prevent vibrations generated by different components from interacting and amplifying noise. On large WTGs, the chassis frame of the nacelle is drilled with holes to ensure the frame will not vibrate in step with the other components in the turbine. As discussed in Chapter 2, regular maintenance is scheduled for the structures. Routine maintenance would also reduce the likelihood of excessive noise and vibration from worn parts or lack of lubricating oils.

4.10.1.3 Electricity Transmission Noise Impacts

Noise associated with the transmission of the electricity from the WTGs to substations and, ultimately, to the public is also a concern. The main sources of noise associated with transmission and distribution are high-voltage transmission lines, substations, and machinery used in transmission line maintenance activities (BWEA 2001).

Overhead lines can be a source of wind-generated noise, but there is little that can be done to avoid wind noise.

Noise from high-voltage overhead transmission lines and distribution lines is also generated by electrical discharge activity and has a characteristic crackling sound. Transmission and distribution lines are designed to operate below the threshold voltage for discharge, but surface irregularities such as raindrops or solid debris can cause discharge activity resulting in noise. The industry's quality control requirements for both the manufacture of conductors and the construction of lines ensure that the conductor is initially free from solid debris and surface damage. Wind-borne debris may stick to lines and increase noise levels during long dry spells, but heavy rain washes the conductors and decreases the noise levels again. The industry has also designed insulators and fittings that are free from continuous discharge activity.

Noise from corona discharge caused by water droplets cannot be avoided. This noise consists of a crackle that is sometimes accompanied by a low-frequency (100 Hz) hum. The mechanism of hum generation is not fully understood, but seems to occur only above a critical rainfall rate or when the conductors are sufficiently wet. Consequently, the routing of new overhead lines takes into account the effects of noise on nearby dwellings (BWEA 2001).

4.10.1.4 Substation Noise Impacts

There are basically two sources of audible noise associated with substations: transformer noise and switchgear noise. Each has a characteristic noise spectrum and pattern of occurrence.

Transformer noise consists of a constant low-frequency hum, with the strongest component occurring at 100 Hz. Noise is a factor that is considered in transformer design, and the current design trends have shown decreases in generated noise levels. The potential effect of noise on surrounding properties is considered, and if necessary, the transformer is enclosed to dampen the noise.

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Switchgear noise is generated by the operation of circuit breakers used to break high-voltage connections at 132 kV and above. An arc formed between the separating contacts has to be "blown out" using a blast of high-pressure gas. The resultant noise is impulsive in character (i.e., loud and of very short duration). The industry is moving away from the use of air-blast circuit breakers in favor of more modern circuit breakers that use a dielectric gas, sulphur hexafluoride (SF_6), to extinguish the arc. Since the gas is contained in a system of pipework and not vented to the atmosphere, as with air-blast circuit breakers, significantly less noise is generated by these newer circuit breakers (BWEA 2001).

4.10.1.5 Maintenance Activity Noise Impacts

Maintenance by the electricity distribution companies does not normally generate a significant level of noise in relation to the normal traffic noise, and any noise generated (e.g., road breaking) is of short duration. However, in the event of emergency repair, work may have to be carried out during quiet times of the day.

The operation of the WGF is not expected to cause noise impacts on the public. Noise-sensitive receivers situated 1,150 ft from the WGF are expected to experience noise levels in the 40 dBA range. With the Proposed Action, the closest noise-sensitive receptor is Goodsprings, located approximately 1.5 mi northeast of the proposed substation. As mentioned in Section 3.10, HUD considers 55 dBA (at nighttime) to be an impact (HUD 1983). Due to the distances between the WGF and noise-sensitive receptors, background noises, such as the usual wind and roadway traffic noises, would be much more noticeable than noise emanating from the WGF. Because of the distance between the WGF and sensitive receptors and the limited duration of construction-activities, no significant construction-related impacts are expected.

4.10.2 Alternative A

The impacts from noise under Alternative A would be slightly greater than the impacts associated with the Proposed Action, since this alternative would include 34 additional WTGs. Due to the distance to the closest noise-sensitive receptor (Goodsprings), no significant impacts from noise would occur.

4.10.3 Alternative B

Impacts from noise under Alternative B would be slightly less than the impacts associated with the Proposed Action, due to the 12% reduction in number of WTGs under this alternative. These impacts would not be considered significant.

4.10.4 No-Action Alternative

Under the No-Action Alternative, there would be no issuance of ROW grants and the proposed project would not be built. Therefore, there would be no impacts related to noise.

4.11 Recreation

For the purposes of this EIS, impacts on recreational resources would be considered significant if they resulted in the following:

- High-density, concentrated, developed recreation sites or facilities
- Noise impacts
- Dust/air quality impacts
- Visual impacts

4.11.1 Proposed Action

Since the proposed WGF would be located in an area of low-intensity, dispersed recreation with no developed recreation sites or facilities, direct, significant impacts on recreational users or resources would not occur. Although there are a variety of recreational opportunities available throughout the project area, there is no specific data on number of people and amount of recreation time spent on public lands in the immediate vicinity of the proposed WGFs. Most public lands within the project area would remain open for public use. Areas where public access would need to be restricted for safety (and vandalism) reasons include WTGs, the substation, and (during construction) lay-down areas/batch plant locations.

Construction noise, dust, and traffic would temporarily affect (cause an intrusion by physical presence) the character and rural, undeveloped "feel" of the area. This could have temporary, negative impacts on people engaged in hiking, camping, birding and other wildlife observation and study, and hunting. Areas in close proximity to the proposed facilities may be avoided by recreationalists, both during and after the construction phase. In the long-term, the improved accessibility of the area would likely lead to increased recreational opportunities and to increased impacts (human use) on the area from users pursuing these opportunities.

The proposed WGF would likely attract additional people to the area. Although normally a development of this type and scale (energy-generation facility) might be perceived as an intrusion into the natural landscape, with WGFs this is not always the case. On the contrary, the novelty of the WTGs, the technology, and the fact that many people have a generally positive opinion of renewable energy projects could make the WGF a unique attraction to the area.

Overall, the impact (physical presence and additional human use) from the Proposed Action on the recreational use of public lands would be minimal. There are over 1.9 million ac of public lands within the Las Vegas District designated as Roaded Natural for recreational opportunities. Once the Proposed Action is completed and operational, it would occupy approximately 325 ac.

4.11.2 Alternative A

Impacts on recreation under Alternative A would be identical to the impacts associated with the Proposed Action.

4.11.3 Alternative B

Impacts on recreation from Alternative B would be the same as the impacts associated with the Proposed Action.

4.11.4 No-Action Alternative

Under the No-Action Alternative, there would be no issuance of ROW grants and the proposed project would not be built. Therefore, there would be no impacts related to recreational resources.

4.12 Land Use

For the purposes of this EIS, impacts on land use would be significant if the action being considered would result in:

- Substantial conflict with adopted environmental plans and community goals

- Substantial conflict with currently established recreational, educational, religious, or scientific uses of the area
- Result in a substantial conversion of prime agricultural land to no-agricultural use or impairment of the agricultural productivity of prime agricultural land.

4.12.1 Proposed Action

The Las Vegas RMP is generally "silent" with regard to authorizations and guidelines for WGFs. However, the plan does state that "all public lands within the planning area, unless otherwise classified, segregated, or withdrawn, and with the exception of areas of Critical Environmental Concern and Wilderness Project areas, are available at the discretion of the agency, for land use leases and permits under Section 505 of the FLPMA...". The plan goes on to state that applications for such leases or permits "would be addressed on a case-by-case basis, where consistent with other resource management objectives and local land uses."

During construction, temporary impacts on existing land uses in the project area could occur due to the movement of workers and materials through the area. Construction noise and dust, as well as some temporary disruption of local traffic, may also temporarily affect visitors to these public lands. Coordination between TMWC, their contractors, the BLM, and owners of private inholdings regarding access and construction scheduling should minimize these disruptions.

Permanent land use impacts are generally determined by the amount of land (of whatever use) actually displaced by the proposed project and by the compatibility of the proposed use with existing, adjacent uses. Under the Proposed Action no significant impact on land use is expected. The WGF would not restrict or inhibit access or restrict the ability of claim holders to mine patented or unpatented mining claims. Approximately 325 ac of land would change in designation from an undeveloped land use to an industrial, energy development. The proposed wind plant would also provide a beneficial use of the land, as the site of a clean, renewable energy generator.

4.12.2 Alternative A

The impacts on land use under Alternative A would result in an additional 0.5 ac of land developed for a WGF. This impact is not significant.

4.12.3 Alternative B

The impacts on land use under Alternative B would be slightly less (0.3 ac) than the impacts associated with the Proposed Action. Land use impacts under Alternative B would not be significant.

4.12.4 No-Action Alternative

Under the No-Action Alternative, there would be no issuance of ROW grants and a proposed WGF would not be built. Therefore, there would be no impacts related to land use.

4.13 Public Services, Utilities, and Electric and Magnetic Fields

For the purposes of this EIS, impacts on public services and utilities would be considered significant if they resulted in the following:

- A breach of published federal, state, or local standards relating to solid waste or litter control

- Activities that would result in a disruption to public utilities and services
- Wasteful use of fuel, water, or energy
- Increased pressure on public utilities or services beyond the capacity of the existing infrastructure.

4.13.1 Proposed Action

4.13.1.1 Impacts on Domestic Water Service

Water needed during construction would be used daily for dust control and to make concrete. No wells would be drilled for the project and all water would be hauled to the site from a municipal source. Therefore, the Proposed Action would have no significant impacts on domestic water service suppliers, and no significant impacts on water service would occur. Additionally, the project would not affect groundwater resources of the area.

4.13.1.2 Impacts on Domestic Wastewater Disposal

Facility workers would generate sanitary waste at the site. A portable toilet service would be contracted to supply and maintain on-site portable toilets and to dispose of sanitary wastes. The sanitary waste would be disposed of at nearby approved facilities. The quantity of wastewater generated is considered minimal. Therefore, no significant impacts on domestic wastewater collection or treatment systems would occur under the Proposed Action.

4.13.1.3 Impacts on Solid Waste Disposal

Solid waste generated at the proposed site would be collected in on-site dumpsters. For solid waste generated at the site, TMWC would contract with an approved waste hauler to collect and dispose of wastes at an approved landfill. Solid waste generated at the site would be nonhazardous and the volume (no estimate available) would be minimal. Impacts from solid waste generation and disposal would not be significant.

Waste generated during the Proposed Action's construction phase would include brush, rock, and construction materials. These wastes would be collected on-site for hauling to and disposal at an approved landfill. Waste would be collected in dumpsters and trucks for disposal. Solid waste generation during construction is an unavoidable, temporary, short-term impact; however, impacts from construction waste generation and disposal would be minimal under the Proposed Action.

4.13.1.4 Impacts on Natural Gas Service

Natural gas would not be required for implementation of the Proposed Action. The proposed WGF would have no affect on the Kern River gas line located east of the project area and would not disrupt gas service to the communities of Goodsprings, Sandy Valley, Jean, or Primm. Therefore, impacts on natural gas service would not occur under the Proposed Action.

4.13.1.5 Impacts on Communications Service

Telephone service to the site would be provided by cellular or mobile phone service. The Proposed Action would have no impact on phone service to the communities of Goodsprings, Sandy Valley, Jean, or Primm. No significant impacts on the users of cellular, mobile phones, or conventional phones would occur. The Proposed Action is not expected to interfere with any of the existing communications facilities in the project area.

4.13.1.6 Impacts on Electrical Service

The implementation of the Proposed Action would result in an increase in electrical power. Power generated would be transferred via underground and overhead collection lines to a WGF substation, where the voltage would again be stepped up for delivery to the 230-kV electric transmission lines.

Power generated by the Proposed Action would be made available to users throughout the power grid. Power would be generated 24 hours a day, depending on weather conditions, and would be beneficial in reducing times when the demand for electrical power is greater than the supply. This would be a beneficial impact.

The VEA 230-kV transmission lines connecting to the project have adequate capacity to receive the power generated by the Proposed Action. Therefore, impacts on electrical service would be considered beneficial.

4.13.1.7 Impacts on Fire and Emergency Service

A potential increase would occur in the demand for emergency services from the towns of Goodsprings, Sandy Valley, and Jean. Employees at the site would be trained to respond to emergency situations including fires and potential health risks. Training of construction and O&M staffs would be required prior to site start up. Implementation of the Proposed Action would increase the risk of fire and emergency medical service. Fire and emergency response teams from Goodsprings, Jean, and Sandy Valley would be used as necessary to provide back-up support to the emergency services provided on-site by TMWC. Construction of the access roads and service roads for the Proposed Action would improve response times for emergency services in the project area and would be a beneficial impact. Overall, impacts on fire and emergency service would not be significant.

4.13.1.8 Impacts on Electric and Magnetic Fields

Human exposure to electric and magnetic fields would increase as a result of implementation of the Proposed Action. Increased recreational use of the project area would expose people to low-level EMFs that were not previously there. This exposure would be of short duration and at levels that would not put the public at risk.

The proposed substation is the closest WGF to the community of Goodsprings, which is approximately 1.5 mi to the northeast. No impacts on the community of Goodsprings is expected from EMFs generated by the proposed WGF or ancillary facilities.

Wildlife and vegetation resources that occur in the substation vicinity would be subject to a larger area influenced by EMFs. Several studies have investigated possible effects of transmission line EMFs on plants, wildlife, and domestic animals (BPA 1989). Even the largest transmission lines do not noticeably affect crop growth. Few studies have attempted to determine whether wildlife may be affected by long-term exposure to these fields. Some effects of EMFs have been found in laboratory animal studies, but it is not known whether such effects occur in wildlife similarly exposed to these fields. Impacts on wildlife and vegetation from EMFs under the Proposed Action are not expected to be significant.

4.13.2 Alternative A

The impacts on public services, utilities, and EMFs under Alternative A would be identical to the impacts associated with the Proposed Action.

4.13.3 Alternative B

The impacts on public services, utilities, and EMFs under Alternative B would be identical to the impacts associated with the Proposed Action.

4.13.4 No-Action Alternative

Under the No-Action Alternative, there would be no approval of ROW applications and the proposed project would not be built. Therefore, there would be no impacts related to public services, utilities, and EMFs.

4.14 Hazardous Materials

For the purposes of this EIS, impacts from hazardous materials would be significant if they resulted in the following:

- Creation of a potential health hazard or involved in the use, production, or disposal of materials that pose a hazard to people or animal populations in the area affected
- Interference with emergency response plans or emergency evacuation plans.
- Triggering of CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act)/SARA and materials are not properly contained, stored, used, or transported.

4.14.1 Proposed Action

4.14.1.1 Construction Impacts

Hazardous materials may occur in the vicinity of the Proposed Action, particularly in association with mines. Although the Phase I Site Assessment revealed no hazardous materials in the vicinity of the Proposed Action site, a detailed investigation of each mine was not conducted. Dynamite was found along one of the access roads during the field surveys, and other hazardous materials may be present in and around mines. Some WGFs may be located in close proximity to active or abandoned mines, but the facilities would not be placed in direct conflict with any of the mines. Therefore, the potential to encounter hazardous materials from mining operations during construction would be minimized.

Construction activities could create the potential for a hazardous materials spill or require disposal of hazardous materials. Potentially hazardous materials used for construction could include diesel fuel, gasoline, lubricants, and coolants. The contractor would be required to comply with Occupational Safety and Health Administration (OSHA) standards and hazardous materials use and disposal standards (CERCLA and SARA) during Proposed Action construction to reduce the potential for a hazardous materials spill.

The potential for small spills exists during construction of the WGF components, such as the gearbox, yaw system, nacelle, and cooling systems. Accidentally dropping equipment or equipment malfunctions could result in ruptures resulting in hazardous components (e.g., oil, lubricant, cooling fluids) being released to the environment.

Spills that could occur during construction or during WGF operation may also include fuel or oil spills. The contractor would be responsible for cleaning up any hazardous spills to soils that may occur and disposing of potentially contaminated soils responsibly and in accordance with EPA standards. Because the contractor would be required to adhere to OSHA, CERCLA, SARA, and EPA guidelines, impacts from hazardous materials during construction of the Proposed Action would not be significant.

4.14.1.2 Operational Impacts

During operation of the proposed WGF, hazardous and potentially hazardous chemicals would be used to lubricate and cool the WGF and ancillary facilities. Determination as to whether a chemical is hazardous or not depends on concentration, degradation, bioaccumulation potential, quantities, ignitability, corrosivity, reactivity, and toxicity. Table 4-10 (p. 4-44) shows the SARA Title III Hazardous Materials Storage Inventory

Table 4-10. Hazardous and Potentially Hazardous Chemicals Proposed for Storage and Use at the Proposed Action Site.

Chemical	Storage Container Type	Maximum Quantity Stored
Gearbox oil	55-gal drum	55 gal
Hydraulic oil	55-gal drum	55 gal
Coolant	55-gal drum	55 gal
Diesel fuel	55-gal drum	55 gal

of hazardous and potentially hazardous chemicals that could be stored and used at the Proposed Action site. These chemicals are designated as hazardous or potentially hazardous due to their regulated status under the SARA. The potential uses and possible hazards of these chemicals are discussed in the following sections.

Each WTG would contain equipment components that require lubricants, oils, or coolants. These potentially hazardous liquids would periodically need to be checked, refilled, or tested. The components of interest include:

- Gearbox: Check oil for level, and sample for laboratory analysis. Each gearbox would contain approximately 34 gal of oil that would not be routinely renewed.
- Yaw System: Bearings and yaw control gears would be greased, and hydraulic oil would be checked. Five gal of hydraulic oil per turbine would be renewed every 5 years.
- Nacelle: All fluids would be contained within the confines of the nacelle and the tower structures.
- Cooling System: The cooling system would contain a mixture of water and ethylene glycol and would be tested annually.

These chemicals would need to be transported to the WGF site and most would be stored at the substation. These chemicals are considered hazardous or potentially hazardous and could create off-site consequences in the event of a spill during transportation. Most of these chemicals are raw materials while others are basic operating liquids such as diesel fuel, cleaning compounds, lubricants and oils, and coolants. The chemicals used at the WGF are planned for storage outside. Spill-containment facilities would be used for all chemical storage and use areas to limit the spread of potentially spilled chemicals. To minimize the potential for harmful effects on people or on the environment, chemicals stored at the Proposed Action site would be held in on-site tanks or drums equipped with secondary containment areas to prevent runoff from the storage area.

Chemicals Stored within Containment Areas. The chemicals described below and listed in Table 4-10 (p. 4-44) would be stored at outside locations within containment areas at the Proposed Action site.

Gearbox oil is contained in the rotor motor of the generator. This is a petroleum lubricating oil with irritation concerns involving the eyes. This product meets the hazardous definition as defined by OSHA as ignitable.

Hydraulic oil would be used in the Yaw systems. This is a mixture of petroleum hydrotreated heavy paraffinic distillates. It is not irritating to the eyes, slightly irritating to skin, mildly irritating when inhaled, and no more than slightly toxic if swallowed. This product meets the hazardous definition as defined by OSHA as ignitable.

Coolant would be used in the water-cooled generators. This is an ethylene glycol/water blend at a 50:50 ratio. There is a minor eye and skin irritation precaution and is harmful if swallowed. This product is regulated by the Toxic Substance Control Act (TSCA).

Diesel fuel would be used in generators and is a hydrocarbon-based fuel. This substance is listed as a toxic substance and subject to the TSCA. There is significant irritation if it gets in the eyes, on skin, or on clothes. Likewise, it should not be swallowed or ingested. It can be aspirated into the lungs, and when working with the substance, breathing vapors, mist, fumes, or dust must be avoided. This product meets the hazardous definition as defined by OSHA as ignitable.

Lubricating oils in sealed equipment have no health hazards indicated, but could be combustible. Oils would be contained within equipment throughout the Proposed Action site, at approximately 40 gal per WTG unit. The total quantity on the Proposed Action site would be approximately 6,120 gal.

Hazardous Materials Protection Actions. Table 4-11 (p. 4-45) lists the factors considered for protective action necessary for evacuation in the event of a chemical spill. No residences are located within the Proposed Action site. The nearest residences are at Goodsprings, located approximately 2 mi from the Proposed Action site. Because no residences are within this area, no significant impact on residential areas could occur.

Transfer, storage, and use of hazardous materials are regulated by the federal government. Prior to transfer, storage, and use of federally regulated hazardous materials, a Hazardous Materials Management Plan (HMMP) would be developed and submitted to the BLM and EPA for review and approval as appropriate. The HMMP would include (1) procedures for storage, use, and handling, (2) a Spill Prevention Control and Countermeasures Plan (SPCCP), (3) emergency response, (4) employee training, (5) reporting, and (6) record keeping. Implementation of these plans would reduce the potential impacts of chemical hazards to less than significant.

The hazardous materials storage at the Proposed Action site would be regulated under the SARA and implemented by the State Fire Marshal's office. Materials with user identification codes or that have flammable listings on their material safety data sheets would need to be reported and managed under the SARA Title III regulations for the storage of hazardous materials. These regulations include disclosure notification, energy-center release reporting, hazardous-chemical inventory reporting, and toxic-release reporting.

4.14.2 Alternative A

The impacts related to hazardous materials under Alternative A would be greater than the impacts associated with the Proposed Action. Under this alternative, there would be 34 additional WTGs and, thus, additional hazardous materials. Implementation of the HMMP will reduce the potential for hazardous materials spills. Impacts associated with this alternative are not expected to be significant.

Table 4-11. Protective Action Decision Factors to Consider.

Hazardous Material	Population Threatened	Weather Conditions
Degree of health hazard	Location	Effect on vapor and cloud movement
Amount involved	Number of people	Potential for change
Containment/control of release	Time to evacuate or protect in place	Effect on evacuation or protection in place
Rate of vapor movement	Ability to control evacuation or protect in place Building types and availability Special institutions or populations (e.g., nursing homes, hospitals, prisons)	

Source: EPA 1993.

4.14.3 Alternative B

The impacts related to hazardous materials under Alternative B would be slightly less than the impacts associated with the Proposed Action since there would be a 12% reduction in turbines. Implementation of the HMMP would reduce potential impacts on less than significant levels.

4.14.4 No-Action Alternative

Under the No-Action Alternative, there would be no approval of ROW applications and the proposed project would not be built. Therefore, there would be no impacts related to hazardous materials.

4.15 Socioeconomics

For the purposes of this EIS, impacts on socioeconomic features would be considered significant if the action being considered resulted in:

- Population growth beyond the capacity of communities to provide adequate housing, schools, and services or otherwise adapt to growth-related social and economic changes
- Revenue flows and expenditures by local, county, or state governments that are inadequate to maintain public services and facilities at established levels
- Any permanent displacement of residents or users of affected areas
- Perceived changes in the existing ways of life resulting in community discontent sufficient to create organizational response and conflict
- A "boom and bust" cycle of employment and related economic growth and decline.

4.15.1 Proposed Action

4.15.1.1 Impacts on Employment

Construction of the Proposed Action would create both direct and indirect employment opportunities in the region. Direct employment would be provided for project construction workers. Indirect employment would be provided for those in construction-material manufacturing and delivery, project goods and services, and project operation and maintenance.

Most employees would be hired locally for construction and operation of the proposed project; therefore, impacts on employment would be beneficial to the Las Vegas Metro area and to some degree the communities of Goodsprings and Sandy Valley. Construction of the proposed project would begin as soon as all environmental clearances were obtained and would last approximately 8 months. For construction, approximately 100 full-time employees would be hired during the 8-month period. After construction is complete, approximately 10 to 20 windsmiths would be hired from the local area to maintain the WGFs. The primary trades needed for construction of the WGF would come from the construction, electric, and equipment operation fields.

The local labor pool in Clark County, Nevada, would primarily be used to fill positions. Considering the diverse economy of the Las Vegas Metro Area, an adequate supply of workers for all project positions would be easily satisfied.

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[illegible] Proposed Action

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Employment levels at the project site would represent less than 1.0% of total employment in Clark County. Construction employment would be a short-term beneficial impact, and O&M employment would be a long-term benefit. After the 8-month construction period, there would be a small impact (competition by workers available for other jobs) on the temporary workforce, as construction workers from the project site begin to look for work elsewhere. However, if the Las Vegas construction industry continues to boom as it has during the last decade, these workers would have a fairly easy time finding new employment.

Construction payroll for the 8-month construction period would be $7.9 million. Average construction wages would be $37.50 per hour. After the 8-month construction period, the O&M payroll would total $364,000 annually, or $7,280,000 over the LOP.

Local workers would be utilized to the maximum extent feasible. It is estimated that about 80 employees would be current residents of Clark County. Most employees would come from the Las Vegas metro area, although some may come from (or choose to relocate to) Goodsprings or Sandy Valley. Residents of Clark County would receive hiring preferences.

Low long-term employment impacts (job availability) would result under the Proposed Action. Jobs created by the proposed project would represent a small proportion of total employment in the region. No mitigation measures would be needed.

4.15.1.2 Impacts on Population

Since the majority of WGF employees (80%) would be residents of Clark County, population change in the region would be very insignificant due to the WGF development; therefore, population impacts (an increase) would be negligible for the life of the project. It is possible that at least some Las Vegas metro-area residents would choose housing options in Goodsprings or Sandy Valley upon acceptance of WGF jobs, but this influx of people is likely to be relatively insignificant.

Because the level of population change created by the WGF project would be very low, there would be negligible LOP impacts (an increase) on the population of the Las Vegas metro area. Most of the WGF workers would be current residents of the Las Vegas metro area who would choose not to relocate. Most people would be unlikely to relocate because the project site is located only 20 mi away, and the communities of Goodsprings and Sandy Valley offer substantially fewer community facilities. Some WGF workers would relocate to the Las Vegas metro area from outside the region, but this number would be very small and would be easily accommodated within the fast growing Las Vegas Metro area. No mitigation measures would be needed.

Within the communities of Sandy Valley and Goodsprings, the current resident population is very small, and any change in population is likely to be noticeable. A relatively small portion of WGF workers may find these communities suit their needs, as housing prices are considerably lower and the commute time to work is significantly less. The rural setting of these towns may suit the tastes of some WGF workers either relocating from Las Vegas or relocating from outside the region. Although new in-migrant WGF workers relocating to these communities may be noticeable, it is unlikely this population change would overburden community facilities, infrastructure, or housing. In addition, Goodsprings and Sandy Valley are likely to experience some population growth during the next decade or so, as the Ivanpah Airport is developed and general growth along the I-15 corridor occurs. These communities would have to upgrade facilities and infrastructure and build more homes to accommodate this growth. Therefore, the small increase in population within the towns of Goodsprings and Sandy Valley would not have an adverse affect (requiring an increase in public facilities) on these communities. No mitigation measures would be needed.

4.15.1.3 Impacts on Housing

Little, if any, additional housing would be required for WGF employees. Most employees would require no new housing because they would already be living in the Las Vegas metro area, Sandy Valley, or Goodsprings. For those who would relocate from within the area or from outside the area, housing options would be available either in the Las Vegas metro area, Jean, Sandy Valley, or Goodsprings.

Assuming that housing availability in Clark County stays the same or improves over 2,000 housing conditions, there would be approximately 11,400 available housing units within the county (including all housing types) (Clark County 2001). In the county, the greatest number of single-family units and rental units being advertised was in Henderson, Las Vegas, and North Las Vegas.

For those workers looking for a more rural setting, shorter commute times to work, and reasonably priced housing options, Sandy Valley has the most housing options. Approximately 12 homes are available at all times during the year, including manufactured homes, custom-built homes, RVs and ranchettes (Gonzalez 2001).

Goodsprings would provide shorter commute times to work, the rural setting, and more reasonably priced housing than in Sandy Valley, but housing availability is not as good. Approximately three homes are listed each year in this community, which would not be enough to accommodate the influx of new households that would be expected as a result of this project (Gonzalez 2001). However, this would provide a few additional housing units to those that are available in Sandy Valley.

Clearly, there is an adequate number of available housing units in Clark County to accommodate the relatively small number of WGF workers who would have to find housing in the area. Impacts (requirements for additional housing) on the supply of housing in Clark County would be almost indiscernible. The project has a low demand for additional housing. No mitigation measures are needed.

4.15.1.4 Impacts on Schools

Most of the children of WGF employees would already live in the region, adding no additional burden caused by additional students on the Clark County Independent School District schools. Current and planned school district facilities would be able to accommodate the additional students. As a result of the proposed project, space would be needed for an estimated 35 additional students during project construction and 5 additional students for each year resulting from O&M.

In the Las Vegas metro area, the impact (accommodation of additional students) on school enrollment would almost be unnoticeable. This school district has been building many new schools and increasing the level of enrollment by over 7% per year to meet the high demands of a fast growing population (Relocation Central.com 2001). The increase in school enrollment demand from the WGF would represent a less than 1% increase over that which would exist without the proposed project.

In Sandy Valley, the influx of new families to the area would be relatively small and would result in approximately 12 additional students during project construction and 3 additional students during O&M. The number of new students would not be overly burdensome to the space available at any of the three schools located in Sandy Valley. New high school students would be bussed from Sandy Valley (and Goodsprings) to Sierra Vista High School in Las Vegas. This brand-new high school would have enough space to accommodate these relatively few students.

In Goodsprings, the Goodsprings Elementary School is very small and currently has only one teacher. This school would have to make substantial changes if it were to accommodate many new students. However, the housing market in Goodsprings is rather constrained, which would keep the number of new households

relocating there (as a result of WGF employment) limited. The impact (accommodation of additional students) on school facilities in Goodsprings as a result of this project is expected to be minimal.

The biggest impact on the Clark County Independent School District would likely occur during the 8-month construction period. During this time period, school buses carrying middle school students between Goodsprings and the Sandy Valley Middle School would likely experience traffic delays, resulting from large trucks carrying heavy equipment to the WGF site. Similarly, buses carrying high school students to and from Sierra Vista High School in Las Vegas to and from Goodsprings and Sandy Valley would likely encounter traffic conflicts (localized traffic congestion) with the trucks that are coming and going from the project site. These traffic delays could be burdensome to these two communities, but may be minimized through mitigation measures.

4.15.1.5 Impacts on Government Taxation and Revenue

Sales tax and ad valorem tax (property tax) would be paid to local governments by the WGF; therefore, impacts (increased dollars) on local government revenue would be beneficial for the LOP. Sales tax on purchases of materials for construction of the WGF would be approximately $1,575,000, assuming $21 million of construction materials are purchased in Clark County. Currently, sales tax is paid at a rate of 7.25% in Clark County, with 6.5% going to the state of Nevada and 0.75% going directly to Clark County.

Property tax would be paid throughout the LOP. Property tax would be paid annually by the WGF and would range from $1,222,500 in year 1 to $178,485 in year 20 of the project.

According to the Clark County Appraisers office, residential property values would not be affected (reduced) by the proposed project in Goodsprings, Sandy Valley, or any other area where new development might occur in the future. Whether or not a property is located near to the proposed WGF would not normally be a consideration in assessing property values each December. However, if a property owner wants to protest the reassessed property appraisal, they are allowed to do so from December 15 to January 15 each year. Under the protest provisions, a property owner could argue that their property value is being adversely affected by the proposed WGF. This type of protest would be considered on a case-by-case basis for each property owner. Therefore, the only way the proposed WGF could affect property values would be through the protest process that is initiated by the property owner, not Clark County (Hartig 2001).

4.15.1.6 Impacts on Community Characteristics, Facilities, and Infrastructure

The power generated by TMWC at the WGF would be delivered to the existing VEA Mead-Pahrump 230-kV transmission line and distributed to various users within the state of Nevada, California, and other western states. The WGF would provide a very small percentage of the power sold within the region. Although California and other western states are currently using almost all of their annual power capabilities, this additional WGF would be unlikely to contribute to electric power rate decreases, but would likely help reduce potential rate increases for the customers of utilities. Unlike fossil-fuel power plants that are subject to fuel-cost inflation, wind is free. In a typical gas-fired plant, for example, fuel makes up about 50% of the cost of each kWh. With a WGF, the only portion of the kWh cost subject to inflation is O&M. Therefore, no fuel inflation costs (for WGF-generated electricity) would be passed on to the customers of these utilities.

Communities that would be most affected (changed) by the WGF would be Sandy Valley, Jean, Primm, Goodsprings, and the Las Vegas metro area. However, it is not anticipated that there would be substantial negative changes in the community character, cohesion, community facilities, or infrastructure for any of these communities.

No schools, parks, churches, libraries, or other community facilities would be changed negatively by this project. Construction vehicles would not drive through the communities of Goodsprings or Sandy Valley and would avoid disrupting the communities in these areas. A beneficial impact (dollars generated on these

communities would be a small increase in spending by WGF employees at local restaurants, bars, gas stations, and grocery stores. No large-scale population increase would occur that would require the construction of new community facilities and infrastructure.

The WGF would be completely self-sufficient in terms of electricity, water, and sewer services. Generators would be used by TMWC to produce electricity on-site. Water for the WGF would be hauled in from outside sources. Portable toilets would be brought to the site and all wastes would be collected and disposed of in compliance with all applicable regulations by a local contractor.

4.15.1.7 Impacts on Transportation

Construction activity associated with the proposed project would have temporary adverse effects (increased traffic) during the 8-month construction period for all areas along the primary transportation routes. These transportation routes would include I-15 through the Las Vegas metro area south to the community of Jean (SH 161 intersection), SH 161 to the Sandy Valley Road turn-off (about 1,000 ft from the community of Goodsprings), Sandy Valley Road from the SH 161 intersection west to Sandy Valley, and from SH 161 north to intersections with BLM roads accessing Shenandoah Peak and Potosi Mountain. In addition, the construction vehicles would likely cause short-term delays and inconveniences for recreationalists, miners, BLM officials, and other people who use the network of gravel roads throughout the proposed project area.

4.15.1.8 Overall Impacts on Socioeconomics

The following is a summation of the direct, indirect, and induced beneficial impacts that would result within the Clark County economy as a result of the proposed project.

- The total number of jobs created during the 8-month construction phase of the proposed project would be approximately 100.
- The total number of O&M jobs created at the WGF would be between 10 and 20 annually.
- The total number of indirect and induced jobs created in Clark County during the 8-month construction period would be approximately 318.
- The total number of indirect and induced jobs created annually in Clark County during the 20-year O&M phase would be approximately 7.
- The total impact on output in the Clark County economy would be approximately $72,122,000 during the 8-month construction phase.
- The total impact annually to output in the Clark County economy during the 10-year O&M phase would be approximately $1,368,000.
- The total impact on value added to the Clark County economy would be approximately $28,029,000 during the 8-month construction phase.
- The total impact on value added to the Clark County economy would be approximately $755,000 annually during the 20-year O&M phase.
- County and state sales tax paid for materials used in conjunction with the WGF would be approximately $1,575,000.
- Property tax collected by Clark County during the LOP would be approximately $11,224,000.

4.15.2 Alternative A

The impacts related to socioeconomic resources under Alternative A would be essentially the same as the impacts associated with the Proposed Action.

4.15.3 Alternative B

The impacts related to socioeconomic resources under Alternative B would be essentially the same as the impacts associated with the Proposed Action.

4.15.4 No-Action Alternative

Under the No-Action Alternative, there would be no approval of ROW applications and the proposed project would not be built. Beneficial impacts from increased employment and increased state and local tax revenues would not be realized. The benefits of capital investment would not occur. Beneficial impacts from increased local and regional electrical power production and transmission would not be realized. No adverse impacts related to socioeconomic conditions would occur.

4.16 Environmental Justice

For the purposes of this EIS, impacts on environmental justice would be considered significant if a disproportionate share of the adverse socioeconomic impacts is borne by minority and low-income communities.

4.16.1 Proposed Action

The construction and operation of the proposed site would be in a currently unpopulated area; no minority or low-income groups live in that area. No low-income or minority populations have been identified that would experience disproportionately high and adverse human health, environmental, or economic impacts under the Proposed Action.

4.16.2 Alternative A

The impacts related to environmental justice under Alternative A would be the same as the impacts associated with the Proposed Action.

4.16.3 Alternative B

The impacts related to environmental justice under Alternative B would be the same as the impacts associated with the Proposed Action.

4.16.4 No-Action Alternative

Under the No-Action Alternative, there would be no approval of ROW grants and the proposed project would not be built. Therefore, there would be no impacts related to environmental justice.

4.17 Cumulative Impacts

Congress established NEPA as a disclosure process designed to provide information to the general public, state and local governments, and federal agencies about the potential impacts of federal decisions and actions affecting the environment (40 CFR 1500). NEPA requires the consideration of cumulative impacts, which are the incremental impacts of an action when added to other past, present, and reasonably foreseeable future

actions (40 CFR 1508.7). This analysis of cumulative impacts was prepared in accordance with those regulations and with the following guidelines:

- Consideration of Cumulative Impacts in EPA Review of NEPA Documents (EPA 1998a)
- CEQ regulations for implementing NEPA
- The BLM RMP for analyzing alternatives for management of public lands and resources (BLM 1998).

Where there are few existing projects or developments and where the environment has not been degraded, the impacts of past and present actions combine to form existing conditions. Existing conditions were considered during the evaluation of the baseline inventory as presented in the Affected Environment sections of this DEIS.

Cumulative impacts result "from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal), individual, or industry undertakes such action. Cumulative impacts can result from individually minor but collectively significant actions occurring over a period of time (40 CFR 1508.7). These actions include on-site or off-site projects that are within the spatial and temporal boundaries of the action considered in this DEIS.

To identify reasonably foreseeable actions in the vicinity of the alternatives, discussions were held with the BLM, Nevada Power, Clark County Comprehensive Planning, and Valley Electric Association. Local newspaper articles were also reviewed. Because some of the projects are in early or preliminary planning stages, detailed information was not available. In instances where there was insufficient detail to quantitatively inventory all possible impacts, assumptions about the type, level, and extent of impacts were made.

The following sections describe reasonably foreseeable actions and the cumulative impacts of those actions considered in conjunction with the Proposed Action, Alternative A, Alternative B, and the No-Action Alternative. Because of the proximity of the Proposed Action with Alternative A and Alternative B, the cumulative impacts are expected to be nearly identical. Where differences were identified, they are described in the applicable resource discussion. Unless otherwise noted, this analysis considers impacts that could occur over the potential 20-year life of the ROW grant (2002–2022).

4.17.1 Current Setting

The Ivanpah Valley of southern Clark County has been previously impacted by developments, including I-15, SH 161 and other roads, Kern River Gas Transmission pipeline, the Union Pacific Railroad, casinos and retail facilities at Primm and Jean, several electric transmission lines, Jean Airport, the Southern Nevada Correctional Center, gravel mining, and periodic off-road vehicle activities. The Sandy Valley has likewise been previously impacted by developments, including SH 161 and other roads, natural gas and electric transmission lines, the Sandy Valley airstrip, residential and retail facilities, agriculture, and periodic off-road vehicle activities. In most cases, development has impacted the natural setting of the valleys. Highway and road development; increased access and, thus, recreational opportunities; and the development of retail, civic, aviation, and industrial facilities, such as transmission lines, pipelines, and airports, have resulted in overall losses of wildlife habitat, decreased open space and visual character values, increased noise levels at some locations within the valleys, and decreases in air quality attributable to increased emissions and fugitive dust.

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6.17.1 Current Setting

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4.17.2 Reasonably Foreseeable Future Actions

Due to the proximity to the Las Vegas metropolitan area, it is probable that development in the areas surrounding the Proposed Action site will continue, which will result in additional environmental impacts. Projects that have been identified for implementation in the reasonably foreseeable future include the following:

- Las Vegas–Southern California Maglev system
- Jean-Primm water transmission system
- Reliant Energy Bighorn generation facility
- Sempra Energy natural gas supply line
- AT&T fiber-optic line
- Southwest Gas transmission line
- Kern River Gas Transmission line expansion
- Ivanpah Valley airport development
- Widening of I-15
- Widening of SH 161 and Sandy Valley Road
- Ivanpah Energy Generating Center, LP

These projects are described below.

4.17.2.1 Las Vegas–Southern California Maglev System

The California Super Speed Train Commission and the American Magline Group have issued a project definition document describing a 300-mph Magnetic Levitation (Maglev) transportation system linking Las Vegas with southern California. The proposed 280-mi alignment would be located almost entirely within the ROW of I-15 throughout southern Clark County and on some lands administered by the BLM. Trains would travel at speeds of up to 300 mph, operating 376 trips per week, 20 hours per day. The intermediate intercity system between Las Vegas and Anaheim would include suburban service between Las Vegas and Primm. A substation and long-term parking would be developed at Primm. The conceptual route includes a scenic traverse through Ivanpah Valley on elevated guideway parallel to the 1-15 alignment and would be located to one side of the freeway, crossing only when topography or development patterns dictate. The project is scheduled to begin construction in 2003 and be completed by 2006.

4.17.2.2 Jean-Primm Water Transmission System

The LVVWD completed a pipeline alignment study in August 2001 for the proposed Jean-Primm water transmission system. This new water system will take water from the LVVWD's existing 2420 Zone Bermuda Reservoir located in southern Las Vegas and deliver it to the communities of Jean and Primm, the Southern Nevada State Correctional Facility, and the proposed Ivanpah Airport. The purpose of the proposed project is to provide supplemental water supplies and improve water quality for water users along the I-15

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corridor. The project is also intended to meet increased demands for water as a result of growth in this area, anticipated as a result of construction of the proposed Ivanpah Valley Airport.

This project will consist of more than 30 mi of large-diameter pipelines, three pump stations, two reservoirs and associated facilities, such as access roads, electrical power, and telemetry control structures. Pipelines will be primarily constructed in existing ROW. The hydraulic capacity of the pipeline will be 27,310 gal per minute (gpm) at the 2420 Zone Bermuda Reservoir and will reduce in several increments as the pipeline traverses south from the 2420 Zone Bermuda Reservoir to Jean. South of Jean, the pipeline will have a hydraulic capacity of 4,825 gpm. No start-of-construction date has been determined at this time.

4.17.2.3 Reliant Energy Bighorn Generation Facility

Reliant Energy is constructing the Bighorn Generation Facility, a new natural-gas-fired power plant that would operate as a combined-cycle facility to provide a year-round source of energy and approximately 580 MW of combined output. This electric generating facility would be solely gas-fired. In this system, exhaust gases from the two combined turbine generators would be routed to heat recovery steam generators, which use the residual heat in the turbine generator exhaust to produce steam. Increased steam generation would be possible through supplemental duct firing by natural gas-fired duct burners. The combined steam output would be routed to a single steam-turbine generator (STG), which produces electricity by transforming the thermal energy of the steam into rotating mechanical energy and then into electrical energy. Power generation at the facility would be transmitted to customers via a newly constructed 230-kV transmission line to the old Jean Substation site and then via an upgraded 69/230-kV transmission line to the Arden Substation.

The power plant would be located on approximately 50 ac of public land managed by the BLM and approximately 166 ac of private lands. The project would consist of 38 mi of overhead combined 230- and 69-kV electric transmission lines and fiber-optic cables within a 100-ft wide ROW, 3 mi of natural gas transmission lines, and 17 ac of drainage control. The facility would be air-cooled and require approximately 255 afy of water for operations (over 90% would be nonpotable water supplied from a wastewater treatment system operated by the Primm casinos). The project has begun construction and is projected to be operational by 2002.

4.17.2.4 Sempra Energy Natural Gas Supply Line

Sempra Energy is planning to construct a gas supply pipeline from the Kern River Gas Transmission pipeline in the vicinity of Primm to the Eldorado Generating Station in Eldorado Valley, Nevada. Although a pipeline route has not been identified, potential alternatives could cross the Lucy Gray Mountains and McCullough Range. Regardless of the route selected, construction of the pipeline would likely require improvements to existing roads, creation of new roads, and a new ROW for the pipeline. New pipeline construction would require a 35- to 50-ft-wide permanent easement and an additional 50-ft-wide temporary-use area throughout the total pipeline length. Other elements of the project could include construction of one or more metering stations and possibly a compressor station.

4.17.2.5 AT&T Fiber-Optic Line

The AT&T fiber-optic cable line is located approximately 5 ft inside the easterly Las Vegas Boulevard South ROW to about 1 mi north of the California-Nevada state line before crossing I-15 to the west. The cable crosses into California west of the Primm casino properties. AT&T reports they are currently planning to relocate their facility but do not have a time frame for when work will begin. Work will consist of relocating the existing fiber-optic line to accommodate the future Ivanpah Valley Airport. The proposed location of the cable has not been determined.

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4.17.2.6 Southwest Gas Transmission Line

Southwest Gas Company is planning a new 10-in-diameter pipeline in Jean. Future ancillary facilities include a pipeline from the proposed Reliant Energy Bighorn Generation Facility in Primm west and north to an existing substation located at the base of the Spring Mountains. The source of gas for this proposed pipeline is the Kern River Gas Transmission pipeline. The location of this proposed facility would likely be within the existing Southwest Gas ROW along the west side of I-15 running south from Las Vegas to Primm and then running west to connect to the proposed Bighorn Generation Facility.

4.17.2.7 Kern River Gas Transmission Line Expansion

The Kern River Gas transmission pipeline runs along the west side of I-15 at the base of the Spring Mountains from the vicinity of Primm to Goodsprings. The Kern River Gas Transmission Company is planning to expand its operation from its current capacity of 700 million ft^3 per day to 835 million ft^3 per day by modifying their operating pressures. The company is also planning to install a loop line consisting of an additional 36-in-diameter pipeline that would increase gas flows by an additional 906 million ft^3 per day to bring total flows to 1,741 million ft^3 per day. Modifications to operating pressures would not require physical changes to the existing pipeline or major improvements to existing compressor or metering facilities. However, the installation of the loop line would require the installation of a new 36-in-diameter loop line, construction of new compression stations, and expansion of existing compression facilities. Although detailed information about the planned loop-line expansion is limited, it is likely that construction of a parallel pipeline, approximately 25 ft from the existing pipeline from Primm to an existing compressor station near SH 161, would occur. The installation of the new pipeline would require an upgrade of the Goodsprings compressor station and expansion of existing corridor easements.

A new Kern River gas metering station is also planned for the vicinity of an existing metering station that is owned and operated by Southwest Gas Company. The new metering station that is proposed as part of the gas supply line to the Reliant Energy Bighorn Generation Facility would contribute to the cumulative impacts of the existing metering station. Similar cumulative impacts would be associated with the portion of the new pipeline that would parallel an existing pipeline to the Primm casinos.

4.17.2.8 Ivanpah Valley Airport

The proposed Ivanpah Valley Airport would be located on a 6,000-ac tract east of I-15 and west of the Union Pacific Railroad, between Primm and Jean. The area is currently undeveloped and under BLM administration, and airport development would be made possible by a land disposal action. Plans for the development of the new airport have not been defined and potential impacts on area lands and the environment cannot be quantified. However, if the Ivanpah Valley Airport were to be developed into a major facility capable of handling large numbers of passengers and cargo, similar to McCarran Airport, direct impacts on the local environment and secondary impacts on the surrounding environment are likely to be extensive.

4.17.2.9 Widening of I-15

The Nevada Department of Transportation is planning to begin widening I-15 between the California/Nevada state line and Primm in late 2001. The widening would include a 20-mi southbound segment from Primm to the state line and a 3-mi long northbound segment near Primm. The widening would take place in the median, leaving two existing lanes open in each direction.

4.17.2.10 Widening of SH 161 and Sandy Valley Road

Clark County has determined that increasing growth along the southern Nevada-California corridor will require the widening of SH 161, which runs from I-15 at Jean through the project area and east to Sandy Valley. It is a two-lane paved county-maintained highway, providing year round access between Sandy Valley and the Ivanpah and Las Vegas Valleys. The highway ROW (Authorizing No. N-54856) could be increased to a 200-ft-wide corridor.

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Secondary cumulative effects associated with the development of these projects within the Ivanpah Valley and Sandy Valley would likely result in increased development of casinos, hotels, retail and civic facilities, and possibly the development of residential neighborhoods. Related impacts would likely include increased traffic along the I-15 corridor and local roads around Jean and Primm, which may result in increased traffic congestion and requirements to upgrade and expand roadways. Increased growth also could contribute to the development of a mass-transit system in the area. Additional impacts could include associated degradation of air quality (emissions and fugitive dust), a decrease in the quantity and quality of wildlife habitat, loss of recreational activity opportunities, increased noise throughout the area, and decreased visual resources values within the area. Beneficial effects would likely include increased tourism and the resulting increase in local revenue and employment opportunities.

4.17.2.11 Ivanpah Energy Center

The proposed construction and operation of the power plant would occur on approximately 40 ac of public land managed by the BLM and would be evaluated through the NEPA process in an EIS. The proposed site would be located in southern Clark County, which is adjacent to I-15, south of Jean, Nevada. The project would include a 230-kV switchyard that would facilitate electrical interconnection between the Ivanpah Energy Center Generation facilities and the 230-kV transmission grid, a 12-in-diameter natural gas supply line from the tie-in point with the existing Kern River Gas Transmission Pipeline to the power plant site, a 4-in-diameter water-supply pipeline from the Southern Nevada Correctional Center's water treatment plant, two 230-kV tie-lines to interconnect the existing VEA Pahrump-Mead 230-kV transmission line into the Ivanpah Switchyard, and two 230-kV tie-lines between the proposed Table Mountain substation and the Ivanpah Switchyard. Additional facilities would include approximately 39 mi of 230-kV transmission line and associated communications cables from the project site to the WAPA Mead substation and new and improved access roads originating from SH 161 leading south to the project site.

4.17.3 Potential Cumulative Impacts

Analysis indicates that construction and operation of the Proposed Action, Alternative A, or Alternative B would not contribute to cumulative impacts on geology and soils, surface water hydrology, groundwater, paleontological resources, traffic, air quality, noise, public services and utilities, EMFs, hazardous waste management, or environmental justice. There would be an incremental contribution to cumulative impacts on recreation, land use, and socioeconomics. Cumulative impacts on biology, cultural resources, and visual resources could be significant.

4.17.3.1 Cumulative Impacts on Geology, Soils, Seismicity, and Mining

The proposed projects in Ivanpah Valley and Sandy Valley would be expected to contribute only site-specific and localized individual ground-surface alterations. The projects collectively would not substantially alter prevailing topography and/or surface relief in the area. The cumulative change/alteration on surface contour features would therefore be minor. Cumulative conflicts with mining would also be minimal.

4.17.3.2 Cumulative Impacts on Surface Water Resources

The cumulative degradation or reduction by the proposed projects on surface water quality and quantity, respectively, are expected to be minimal. Little to no surface water exists in the area or is being proposed for development. Increased road maintenance, traffic on unimproved roads, and off-road vehicle use resulting from the development of the projects would likely contribute to minor impairment of surface water quality over the short-term. Adherences to standard and site-specific permit conditions for construction and operation of the facilities would ensure that no noteworthy individual or collective impacts would occur on surface water quality.

4.17.3.3 Cumulative Impacts on Groundwater Resources

The Proposed Action and the other projects proposed for development in the area would not cause contamination or a reduction in volume of groundwater resources. There would likely be an increased demand for potable water to support the induced developments, such as casinos and retail facilities. However, the quality of the groundwater in this area is historically marginal to poor for use as drinking water due to the presence of evaporite minerals within the sediments (Burbey 1997). It is likely that potable water will be obtained from sources outside of the area and transmitted through pipelines originating in Las Vegas. The cumulative impacts of the multiple land uses proposed within the area are not likely to contribute to significant impacts on groundwater resources.

4.17.3.4 Cumulative Impacts on Paleontological Resources

The combined disturbance of the Proposed Action and other proposed developments in the region could uncover or destroy important fossils. All new development activities on public lands would be subject to stipulations promulgated in BLM guidelines for paleontologic surveys and evaluations and paleontologist qualifications. Adherence to these guidelines would prevent significant impacts on fossils throughout these combined project areas. Existing disturbance from mining and roads must be cleared for paleontologic resources through Nevada Bureau of Mines and Geology permitting or a ROW grant application, respectively. Therefore, cumulative impacts of past and future mineral developments on paleontologic resources in the analysis area would be negligible.

4.17.3.5 Cumulative Impacts on Biological Resources

The Proposed Action would impact approximately 754 ac during construction and 325 ac permanently. Much of the natural vegetation would be removed where necessary to construct the WGF and ancillary facilities, reducing the value of wildlife habitat. Reasonable activities, including restoration of impacted areas not used for permanent construction, would convert some of this land back into habitat.

Cumulative effects on biological resources are generally additive and proportional to the amount of ground disturbance within specific habitat areas. The developments proposed in this area would potentially impact both federal- and state-listed sensitive species. However, the use of existing utility corridors and existing road patterns would lessen the impact on wildlife habitat and loss of vegetation, as well as decrease impacts on air quality.

Mitigation measures, described in Section 5.5 would be implemented for either the Proposed Action Alternative A, or Alternative B.

4.17.3.6 Cumulative Impacts on Cultural Resources

Based on the inventory completed to date, cultural resources within the area could be impacted and it is possible that some of these impacts could be mitigated. SHPO and tribal consultations as projects are developed will assist in these determinations. Impacts due to the Proposed Action, Alternative A, and Alternative B on cultural resources cannot be determined at this time. The BLM and the Nevada State Historic Preservation Office have not yet made National Historic Register eligibility determinations for several archaeological sites pending the testing of five historic sites and one prehistoric site as outlined in Table 3-6 (p. 3-42). Requests for formal consultation with interested and affected Native American Tribes have been received. This consultation will determine if TCPs are located within the APE. The final site eligibility determinations and the assessment of potential TCPs within the project area will be included in the FEIS.

4.17.3.7 Cumulative Impacts on Transportation and Circulation

The Proposed Action is unlikely to have significant impacts on transportation and circulation within the area, either during construction or during the LOP. The multiple proposed projects in the area would likely be

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developed in existing utility ROW or in rural undeveloped area. These utility projects would have minimal impacts (congestion, traffic delays, accidents) on traffic during construction. Those projects that involve transportation-related improvements and/or amendments would likely have significant impacts on local and regional traffic in the short-term, with the goal of decreasing impacts over the LOP. The potential for an increase in the development of retail, civic, and recreational facilities in the area as a result of these projects being developed would likely increase overall traffic volume in and through the area as well as result in congestion during peak-use periods. It is unlikely that all proposed projects would be developed during the same time period and therefore would not reach peak traffic conditions simultaneously. Consequently, effects of actual conditions would probably be less.

4.17.3.8 Cumulative Impacts on Air Quality

As previously discussed, construction and operation of the Proposed Action would minimally affect air quality in the area. Cumulative effects of all other proposed projects in the area are also expected to represent minimal impacts on air quality. Although sufficient information regarding the potential development of the Ivanpah Valley Airport is not available, the airport project has the potential to contribute far greater impacts on the air quality within the Ivanpah Valley than could be realized by any of the previously referenced projects or combinations of new projects. Although large land-disturbing developments, such as the widening of I-15, would contribute to cumulative impacts on air quality, impacts would largely be limited to construction activities.

4.17.3.9 Cumulative Impacts on Visual Resources

The Proposed Action would have significant impacts on visual resources in the area. Many of the other proposed developments would occur within existing infrastructure ROW and some would be constructed underground. The Maglev and Reliant Energy Bighorn Generation Facility would be new additions to the visual landscape and the contrast created between these developments and the existing landscape could result in moderately significant impacts on visual resources. With the exception of the Ivanpah Valley Airport, all other proposed projects, either individually or in combination, could result in minimal to moderate cumulative impacts on visual resources. The Ivanpah Valley Airport, if developed, would likely result in impacts on visual resources within the area that would eclipse those of the other projects, including the Maglev and the Bighorn Generation Facility.

4.17.3.10 Cumulative Impacts on Noise

Existing land uses within Ivanpah Valley and Sandy Valley contribute to noise levels, but wind is generally the primary noise source. The Proposed Action would not significantly impact noise levels because turbine noise is typically masked by the wind at short distances from WTGs and there are few occupied residences within or adjacent to the proposed projects. The development of the proposed projects, either individually or in combination, would increase the number of noise-producing facilities within the area, which may augment the level of impacts on other resources (e.g., wildlife displacement or increased impacts on recreational users). While there would be an increase in ambient noise in the immediate vicinity of each project, it would not be a noteworthy cumulative effect. The development of the Ivanpah Valley Airport would likely result in significant impacts on ambient noise levels and induce significant impacts on other resources such as wildlife, recreation, and landscape character.

4.17.3.11 Cumulative Impacts on Land Use

Growth in south Clark County is limited by available and developable land, as well as resources such as potable water, and, thus, has retained a predominantly rural character. Both Ivanpah Valley and Sandy Valley can be described as rural in character with development being limited by a lack of readily available resources, such as potable water. The Proposed Action and other multiple projects in the area would be primarily located on public lands surrounded by largely undeveloped tracts. Many of the proposed projects would be constructed within existing infrastructure ROW. The proposed projects are either currently consistent and

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4.17.2.8 Cumulative Impacts on Air Quality

[illegible]

4.17.2.9 Cumulative Impacts on Visual Resources

[illegible]

4.17.2.10 Cumulative Impacts on Noise

[illegible]

4.17.2.11 Cumulative Impacts on Land Use

[illegible]

compatible with the existing plans and zoning or would seek approval for a change in zoning, such as in the case of the Ivanpah Valley Airport. With the exception of the airport, the proposed projects, individually or in combination, are not expected to substantially alter present or future land use patterns; therefore, the collective impacts would not be significant. The development of the airport would impact over 6,000 ac of previously undisturbed land which would likely result in significant impacts on land use and augment the levels of impacts on other resources.

4.17.3.12 Cumulative Impacts on Public Services, Utilities, Electric and Magnetic Fields

As previously discussed, the Proposed Action would have minimal impacts on public service, utilities, and EMFs. Approximately 100 construction employees and 10 to 20 O&M employees necessary for the development of the WGF would likely be hired from and living in the Las Vegas metropolitan area. Therefore, minimal increased demand would be placed on Ivanpah Valley and/or Sandy Valley public services and utilities, such as schools, police, fire protection, water, sewer, or waste disposal. Individually or in combination, the other proposed projects would likely result in minimal cumulative effects on these services for the same reasons. However, development of the Ivanpah Valley Airport and the Maglev would likely result in increased recreational, retail, and civic facilities in the area and, thus, place increased demands upon these services, resulting in potentially significant cumulative impacts.

Power generated by the proposed WGF and Reliant Energy Bighorn Generation Facility would be made available to meet the demands of the Las Vegas Valley and surrounding areas. The power would be reliable and would be available 24 hours per day and would reduce the potential for Las Vegas Valley brown-out conditions that are projected to occur (and that have been experienced in other areas of the country). Because the power generated would be provided to a regional power grid and be available in an open and partially deregulated marketplace, it cannot be determined where the power would be used; therefore, ultimate power users are unknown and cannot be determined.

The construction of additional transmission lines would have an added cumulative impact within a ROW. This impact would be reduced by design modifications, such as alternative arrangements of the conductors and double circuits. However, there should be little or no difference in EMF levels at the edge of a corridor caused by adding one or more transmission lines to an existing utility corridor.

4.17.3.13 Cumulative Impacts on Hazardous Materials

It is likely that all proposed projects would involve the storage, use, and disposal of chemicals and hazardous materials. Before approval, all foreseeable actions would likely be required to institute chemical handling and storage plans. Spill prevention plans would be required and would include construction of chemical handling and containment facilities. In addition, staff would be trained in hazardous materials safety, handling, cleanup, and removal. With implementation of these measures, cumulative impacts would likely be considered acceptable.

Collectively, each project would require occasional shipments of materials that would be delivered by truck via I-15. Because trucks represent approximately 9% of traffic on I-15, and many already carry hazardous-rated materials, the incremental increase resulting from these projects would not cumulatively be important.

On-site waste would likely be accumulated and disposed of according to regulatory requirements established for the type of waste generated. Actual waste volumes to be generated may be small, but estimates are not available at this time. Waste minimization efforts would likely be implemented, and it is reasonable to expect that recycling efforts would be encouraged as an ongoing activity at each facility to reduce the quantity of waste. All potential developments would be considered to have similar waste management inventories and management requirements. Waste would be disposed of at an appropriately approved off-site facility licensed to receive the specific types of waste generated. The Apex Regional Landfill accepts more than 2,000 tons per day of municipal and industrial waste from rural and urban Las Vegas, North Las Vegas, and Henderson. It

has an estimated useful life of about 100 years, and the amount of waste from these facilities would not appreciably shorten the useful life of the landfill.

4.17.3.14 Cumulative Impacts on Socioeconomics

The Las Vegas Valley and southern Nevada have existing high and projected population growth and associated projected infrastructure demands. The Proposed Action and the multiple other proposed projects are predominately infrastructure developments or improvements. The combined effects of the proposed projects would likely result in beneficial impacts on socioeconomics, both regionally and locally.

The transportation developments would have a significant beneficial impact on both regional and local traffic volume and congestion and would potentially promote increased commerce and tourism and the resulting revenue. Both the Maglev and Ivanpah Valley Airport would significantly increase traffic through the area and provide opportunities for employment and revenue-generating-induced developments such as casinos, hotels, and retail facilities within Clark County.

While the majority of the natural-gas-transmission-system developments that would traverse south Clark County would deliver gas to facilities outside of the area, there would likely be moderate beneficial impacts on the generation of electrical power locally. The Kern River Gas Transmission system would provide natural gas to the Reliant Bighorn Generation Facility.

Communities throughout the southwestern United States, including Las Vegas and southern Nevada, have been experiencing electrical shortages and brownout conditions. Both the Proposed Action and the Bighorn Generation Facility would serve existing and future population and economic growth by increasing electricity availability and reliability. The combined power output would probably not result in significant cost reductions in electric power locally or regionally.

In summary, because the growth is already occurring regionally and locally, these actions are cumulatively considered to be growth accommodating rather than growth inducing.

4.17.3.15 Cumulative Impacts on Environmental Justice

Environmental justice is a strategy to address environmental concerns within the context of agency operations in minority populations and low-income populations. Specifically, the analysis focuses on demographics, geographic, economics, and human health and risk factors. Neither the Proposed Action nor the other multiple projects, individually or in combination, would economically or socially impact any minority or low-income populations, singularly or collectively.

4.18 Unavoidable Adverse Effects

The mitigation measures incorporated in the project description throughout the preceding discussion of impacts and in Chapter 5.0 would avoid or minimize many of the potential adverse effects. However, not all adverse effects can be avoided, nor is mitigation 100% effective in remediating all impacts. There would be at least a minimal amount of unavoidable adverse impact on all resources present in the WGF area for at least a short time, due to the presence of equipment and humans in the area and the time necessary for mitigation (e.g., reclamation) to be effective. Significant unavoidable impacts associated with the project would include impacts on desert bighorn sheep during the lambing season and impacts associated with WTGs located in VRM Class II and Class III areas. At this time, it is unknown whether significant unavoidable impacts on cultural resources would occur.

4.19 Irreversible and Irretrievable Commitment of Resources

An irreversible and irretrievable impact is defined as a permanent reduction or loss of a resource that once lost cannot be regained. Most energy development projects (e.g., gas, oil, coal) result in an irreversible and irretrievable commitment of the power-generating resources (e.g., fossil fuels). Wind is a renewable resource that would not be depleted by the proposed project and would offset the need to consume fossil fuels.

The loss of productivity (i.e., forage, wildlife habitat) from lands devoted to project activities (i.e., WTG locations, roads) 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 reclamation and revegetation; however, the vegetation community may take more than 20 years after the LOP to recover.

Inadvertent or accidental destruction of paleontologic or cultural resources during construction would be an irreversible and irretrievable loss, but it is not likely to be a significant impact since archaeological and paleontologic data recovery and monitoring activities would be conducted as deemed appropriate by the BLM.

There would be an irreversible and irretrievable commitment of the energy used during construction, drilling, production, and reclamation associated with the proposed project. Foundations or other facilities greater than 6 in below ground surface would be permanent and abandoned in place. They cannot be recovered due to practical or economic considerations, so they would be irreversibly and irretrievably committed.

4.20 Short-Term Use of the Environment Vs. Long-Term Productivity

For the purposes of this discussion, short-term use of the environment is that use during the LOP, and long-term productivity refers to the period after the project is completed and the area reclaimed.

The short-term use of the environment would affect the resources as discussed in Sections 4.1 through 4.16. This use and the associated impacts would not significantly affect the long-term productivity of the WGF or adjacent areas. After the project is completed and disturbed areas reclaimed, the same resources that were present prior to the project would be available. Because wind is a renewable resource, there would be no short- or long-term loss of this power-generating resource. It may take 20 years or more after the LOP for some of the reclaimed area to revegetate; however, reclamation would provide conditions to support wildlife and recreation. Use of the WGF during the LOP would not preclude the subsequent long-term use of the area for any purpose for which it was originally suited prior to the project.

5.0 MITIGATION AND MONITORING

Mitigation and monitoring measures discussed in this chapter were developed in response to the impacts identified in Chapter 4 and during the scoping process. Mitigation has been recommended to reduce potentially adverse effects on the human and natural environment that have not been addressed in the description or design of the Proposed Action or alternatives. Mitigation and monitoring measures describe how project activities would be implemented to ensure compliance with federal, state, and local laws; resource management goals and objectives identified by the BLM; applicable ROW stipulations; and additional environmental protections specific to the WGF. All mitigation and monitoring measures would be applied to the Proposed Action or other alternatives selected. Impacts and mitigation measures for the Proposed Action and the alternatives are detailed in Table ES-1 (p. xxi).

Restoration plans would be provided with the FEIS and POD according to guidelines established by the BLM. The restoration plans would detail all practices necessary for restoration on areas initially disturbed during construction that would not be required for the operation of the WGF (e.g., laydown-areas/batch-plants along the WTG string corridors and transmission lines). Plans would include configurations of the reshaped topography and drainage systems, segregation and protection of surface soils, surface manipulations, waste disposal seedbed preparation, replanting of succulents, and seed mixture application. A schedule for commencement and completion of restoration actions and monitoring protocol, including restoration success criteria, would also be included.

BLM-approved mitigating measures will be brought forward as stipulations in the Record of Decision and the grant. Mitigating measures in the POD will be identified as stipulations in the POD and grant.

All phases of the Proposed Action would be conducted by TMWC, other future WGF owners, and their contractors in full compliance with all applicable federal, state, and local laws and regulations and within the guidelines specified in the approved ROW grant.

5.1 Geology, Seismicity, Soils, and Mining

No geologic conditions at the proposed site would require special mitigation measures. However, some soil properties would need to be considered to mitigate potential problems during and after construction. Among these properties are compaction, corrosivity, and potential for erosion. These soil properties should not impact the Proposed Action if proper engineering designs and construction materials are used.

Impacts on geology and soils would be mitigated, first and foremost, by minimizing surface disturbance wherever feasible. A number of appropriate practices support this approach including:

- Minimizing surface disturbance during construction, where possible.
- Avoiding areas with high erosion potential (e.g., unstable soils, windblown deposits, slopes greater than 15%, floodplains), where feasible.
- Selectively salvaging topsoil from disturbed areas, protecting topsoil stockpiles from wind and water erosion, and returning topsoil to regraded surfaces during reclamation.
- Using appropriate erosion control and sedimentation techniques.
- Promptly revegetating disturbed areas using a BLM-approved seed mixture.

Potential wind erosion and fugitive dust generated during construction can be minimized by applying water or chemical dust suppressants and by avoiding the treading on areas not immediately involved in the construction. Soils disturbed during construction activities may require revegetation or other stabilization methods to prevent erosion. Stormwater management plans would be prepared for both construction and facility operation to minimize and control erosion from water runoff. Proper grading would also be incorporated into the facility design so that water runoff is directed to drainage and retention structures.

The potential for seismically induced strong ground motions is relatively low. No special mitigation measures are warranted. TMWC intends to design facilities to meet or exceed seismic criteria established for facilities in this part of southern Nevada (Zone 2B) by the Uniform Building Code.

5.2 Surface Water Hydrology

BMPs would be implemented during construction to minimize potential impacts on surface water quality. The BMPs would consist of measures such as dust control, gravel entrances and exits, the placement of sand bags or other devices that block or detain sediment-laden waters, and other measures identified in a stormwater pollution prevention plan (SWPPP).

A SWPPP plan would be prepared to minimize potential degradation of surface water resources. Included in this plan would be BMPs to avoid, control, and remediate spills that may occur during project construction. The BMPs would also address erosion and sedimentation issues and may include the use of soil wetting for dust control and the installation of silt fences or the placement of straw bales to control erosion during construction. The contractor may also include a grading plan, a construction schedule, and a BMP implementation schedule. A development plan that addresses permanent measures to be implemented upon construction completion would also be included.

5.3 Groundwater Resources

Implementation of the Proposed Action or Alternatives A or B would have no impact on groundwater quantity or quality. No mitigation measures would be required.

5.4 Paleontological Resources

Because the scientific value of fossils lies in the information they contain rather than in the fossilized materials themselves, any mitigation program must focus upon recovering not every fossil and/or fossil fragment encountered, but rather those fossils that are sufficiently complete and diagnostic to allow generic and specific identifications. If paleontologic resources were encountered during construction, work would cease in the immediate area of discovery and the BLM would be notified. A qualified paleontologist retained by TMWC (approved by BLM) would evaluate the paleontologic material in consultation with the BLM and make recommendations concerning mitigation.

The mitigation guidelines listed below have proved to be effective on numerous southern Nevada projects and would be employed during construction activities for all aspects of the project. Specifics of the mitigation efforts, including the monitoring of the excavation, curation, preparation of the final report, and the storage of specimens, are detailed in Appendix C.

- Preparation and presentation of an orientation workshop to explain paleontologic mitigation guidelines and procedures to construction personnel.

- Preconstruction field reconnaissance of the Table Mountain WGF site and all associated areas of potential impact (power line sites, access roads, substations, etc.) by qualified professional vertebrate

paleontologists with regional experience and under permit from the BLM. Personnel will recover representative samples of exposed marine limestone formations and reconnoiter exposures of rock units having undetermined paleontologic sensitivity to assess the potential for these units to yield significant fossil remains.

- Spot check paleontologic monitoring in rock units determined to have undetermined paleontologic sensitivity by a qualified professional vertebrate paleontologist with regional experience and under permit from the BLM. Salvage would include recovery of exposed significant paleontologic resources and sampling where necessary to recover microfossil remains.
- Stabilization, documentation, and reburial of resources that cannot safely be recovered or otherwise preserved (e.g., avoided).
- Preparation of recovered paleontologic resources to a point of identification and permanent preservation, including stabilization of large remains and screenwashing of fossiliferous sediments to recover significant microfossil remains.
- Preservation and curation of recovered significant fossil resources, including all associated contextual data, at a qualified professional repository with long-term retrievable storage.
- Provide appropriate level of information/education to construction contractors and employees.

5.5 Biological Resources

5.5.1 Vegetation

Mitigation measures, approved by the BLM, including the Restoration Plan, would be incorporated into the Proposed Action or alternatives to minimize direct and indirect impacts on acceptable levels. With these measures, impacts on vegetation would not be significant.

WTG corridors and associated overhead distribution lines would be located to avoid and/or minimize impacts in areas of high value (i.e., sensitive plant habitats, wetlands, etc.), where feasible. Minimal vegetation removal would be employed during distribution line construction.

The restoration of the project area would be outlined in the project Restoration Plan and included as an appendix to the FEIS. This plan would outline revegetation, wildlife habitat reclamation, soil stabilization, and erosion reduction measures. This revegetation effort would be monitored, and the plan's approved adaptive-management component would assist the project leader in meeting the BLM-designated success criteria.

A restoration plan, approved by the BLM, will be incorporated into the POD. The restoration plan will detail the actions required to restore temporarily disturbed areas to acceptable condition. Restoration success criteria will be established and a monitoring protocol and schedule will be developed to evaluate the effectiveness of the actions over time. Additionally, succulent plant material, surface soils, and vegetation to be bladed will be salvaged from permanently disturbed sites prior to construction. The disposition of this material (stockpiling areas) will be outlined in the restoration plan. Implementation of restoration actions will accelerate the recovery of temporarily disturbed areas and improve habitat for special status species, all wildlife, desert bighorn, and wild horses and burros.

Nevada State Law (NRS 527.060–.120) protects any species in the Cactaceae family and members of the genus *Yucca* and *Agave*. Ground disturbance poses a potential for impacts on these species, in which case

mitigation measures would be necessary. Potential impacts on cacti and yuccas could be reduced by the placement of structures in areas with low densities, where feasible. Those that could not be avoided would be removed and transplanted. A standard operating procedure for the salvage, transportation, and care of cacti and yucca on public lands is already established and would be implemented for this project. Most of the plants would be relocated to a designated salvage area and stockpiled until the completion of construction. These plants would be used as part of the reclamation plan to revegetate the area. Coordination with the BLM botanist would be required to determine the exact percentage of cacti and yucca that would be used in the reclamation plan.

Only two of the special status plant species were observed during field investigations. The Rosy twotone beardtongue and the Yellow twotone beardtongue were identified along washes in Section 16, Township 24 South and Range 58 East. Preconstruction surveys for the beardtongue would be conducted during the spring, and individual plants would be marked. Large areas where beardtongue is found would be flagged for possible avoidance and would not be disturbed without prior approval by the BLM. Seed collection, as well as the stockpiling of surface soil for the two bicolor penstemons, will be a mitigation requirement. In addition, vehicular access to the site would be restricted to designated access roads only.

If any other special status plant species is found during construction, proper BLM protocol would be followed regarding relocation of individual plants or recovery and stockpiling of the seeds for future propagation. Impacts on special status plant species are expected to be less than significant with the implementation of prescribed BLM mitigation measures and cacti and yucca salvage procedures.

The chances of spreading noxious weeds into the project area would be greatly reduced by implementing the following mitigation measures. These measures include mechanical or herbicidal methods to control and remove noxious weeds prior to construction from all areas to be disturbed.

The undercarriages of vehicles that are to be used during construction would be washed prior to entering the project area at designated water wash stations. Wash station locations would be selected to reduce the potential for infestations from vehicular traffic during construction. While washing the construction vehicles, focus should be on the tires, axles, bumpers, and undercarriage.

Upon completing construction of the proposed facility, the disturbed areas would be reseeded with a BLM-approved seed mixture. The area would be monitored according to BLM standards for reclamation success and the establishment of noxious weeds.

5.5.2 Wildlife

TMWC will provide funding to support a variety of studies that could be conducted during the construction period and for some period of time after the WPP is fully operational. The specifics of these studies will be determined, prioritized, and implemented at the discretion of NDOW. The discussions below outline specific mitigation measures for desert tortoise, wild horse and burro, desert bighorn sheep, avifauna, bats, banded Gila monster and chuckwalla.

5.5.2.1 Desert Tortoise

Mitigation measures for the desert tortoise include the following elements:

- Desert tortoise protection education
- Flagging construction boundaries
- Tortoise removal

- Speed limits and signage
- Trash and litter control
- Spill handling procedures
- Construction monitoring
- Habitat compensation
- Reporting requirements

Desert Tortoise Protection Education. A desert tortoise education program would be presented to all personnel on-site during construction and operation. This program would contain information concerning the biology and distribution of the desert tortoise, its legal status and occurrence in the proposed project area, the definition of "take" and associated penalties, measures designed to minimize the effects of construction activities, the means by which employees can help facilitate this process, and reporting procedures to be implemented when desert tortoises are encountered.

Flagging Construction Boundaries. All areas to be disturbed would have boundaries flagged before beginning the activity, and all disturbances would be confined to the flagged areas. All project personnel would be instructed that their activities must be confined to locations within the flagged areas. Disturbance beyond the actual construction zone is prohibited.

Tortoise Removal. Before surface-disturbing activities were initiated, a qualified biologist would conduct a clearance survey to locate and remove tortoises using techniques that provide a full coverage of all areas of tortoise habitat to be disturbed. Two passes of complete coverage would be accomplished. All desert tortoise burrows, and other species' burrows that may be used by tortoises, would be examined to determine occupancy of each burrow by desert tortoises.

All burrows found within areas proposed for disturbance, whether occupied or vacant, would be excavated by a qualified biologist and collapsed or blocked to prevent desert tortoise reentry. All burrows would be excavated with hand tools to allow removal of tortoises or tortoise eggs. All tortoise handling and burrow excavations, including nests, would be conducted by a qualified biologist in accordance with USFWS-approved protocol (Desert Tortoise Council 1994, revised 1999).

All desert tortoise and tortoise eggs would be relocated off-site 300 to 1,000 ft into adjacent undisturbed habitat. Tortoises found aboveground would be placed under a marked bush in the shade. A tortoise located in a burrow would be placed in an existing unoccupied burrow of the same size and orientation as the one from which it was taken. If a suitable natural burrow is unavailable, a qualified biologist would construct one of the same size and orientation as the one from which it was removed, using the protocol for burrow construction found in Section B-5-f (Desert Tortoise Council 1994, revised 1999). Any tortoise found within 1 hour before nightfall would be placed in a separate, clean cardboard box and held overnight in a cool location. The box would be covered and kept upright at all times to minimize stress on the tortoise. Each box would be used once and then disposed of properly. The tortoise would be released the next day using the procedures described above. Each tortoise would be handled with new, disposable latex gloves. After use, the gloves would be properly discarded and a fresh set used for each subsequent tortoise handling.

Speed Limits and Signage. Vehicles shall not exceed 25 mph on access roads during periods of highest tortoise activity (March 1 through November 1). Speed-limit signage would be installed along access and

service roads. Caution signs indicating the presence of desert tortoise would be posted along access roads and service roads. Qualified on-site biologists would monitor speed-limit compliance during construction.

Trash and Litter Control. Trash and food items would be disposed of promptly in predator-proof containers with resealing lids. Trash containers would be emptied daily, and waste would be removed and disposed of in an approved off-site landfill. Trash removal would reduce the attractiveness of the area to opportunistic predators such as the desert kit fox, coyotes, and common ravens. Construction waste, including but not limited to broken parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, boxes, and welding rods would be removed from the site daily and disposed of properly. Sanitary facilities for workers will be equipped with portable toilets.

Spill Handling Procedures. All fuel, transmission or brake fluid leaks, or other hazardous waste leaks, spills, or releases would be reported immediately to a designated environmental supervisor. The environmental supervisor shall be responsible for enforcing and implementing the project spill prevention and containment plan, which would include spill material removal and disposal to an approved off-site landfill and possibly notifying the appropriate federal agency.

Construction Methods. The following construction methods would be implemented:

- Cross-country travel and travel outside construction zones (marked with flagging) would be prohibited.
- Open trenches or holes that pose a tortoise entrapment and injury risk would be covered and/or escape ramps would be located not less than every 1,000 ft.
- Stockpiled pipes that could attract tortoises would be capped or checked by a biological monitor before use.

Construction Monitoring. During construction activities, qualified on-site biologists would monitor for tortoises and move them if necessary, provide instruction as needed, and monitor and report on compliance. If approved tortoise fencing was installed along the perimeter of the proposed facilities, the number of on-site biologists needed would be reduced or eliminated.

Habitat Compensation. In accordance with the USFWS Biological Opinion (pending), remuneration fees of $623 per acre (adjusted to year 2001) would be paid to compensate for impacts on tortoise habitat on public lands. The Proposed Action would disturb approximately 270 ac, for a total of $168,210 if paid in the year 2002. This cost would be indexed for inflation, and it would be adjusted for the year the ROW grant is approved.

Reporting Requirements. The on-site biologist would record information about each desert tortoise encountered. Each observation would include the following: location, date and time of observation, whether the tortoise was handled, its general health and whether it voided its bladder, location the tortoise was moved from and the location moved to, and unique physical characteristics. Reports documenting the effectiveness of and compliance with the tortoise protection measures would be prepared every 6 months. A final report would be reviewed and approved by the BLM and then submitted to USFWS within 90 days of completion of construction.

5.5.2.2 Wild Horse and Burro

With the incorporation of proposed mitigation measures, implementation of the Proposed Action would not result in significant impacts to wild horses and burros. Mitigation would include the use of appropriate roadway signage to alert traffic to the potential of encounters, installation of guy-wire barriers associated with

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Trash and Litter Control. Trash and food items would be disposed of [illegible]

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meteorological towers, and habitat restoration efforts as outlined in the Habitat Restoration Plan. Implementation of these measures would be coordinated with BLM wild horse and burro resource specialists.

The construction of the project is not expected to negatively impact wild horse or burro populations or their habitat. Access roads will utilize existing roads to the greatest extent possible. Improvements to existing roads will slightly reduce available habitat in the HMA. Within the HMA, most project facilities are located along steep ridgelines, which provide little habitat for burros and no habitat for horses. Habitats disturbed on Table Mountain are outside the HMA and are not utilized by wild horses and burros. A BLM approved restoration plan will be incorporated into the project to restore all temporary use areas. Speed restrictions on access and service roads, in addition to warning signs, will reduce the potential for vehicular collisions with animals.

Increased human presence and construction noise may cause wild horses and burros to temporarily avoid the project area, however the HMA herd does not heavily use this area due to the lack of reliable surface water. The only available natural water sources, Cave Spring and North Cave Spring, are located over 1,500 ft away from the proposed project facilities in the Wilson Pass area. The project is not expected to affect the limited water resources available to horses or burros. Burros are known to utilize Cave Spring, but there is no evidence they use the guzzler in Deadman's Canyon. Wild horses are not known to utilize any of the water sources in the project area.

5.5.2.3 Desert Bighorn Sheep

Implementation of the Proposed Action or alternatives would pose a significant impact on the desert bighorn sheep during construction. TMWC is committed to minimizing and mitigating impacts on this important species through the use of state-of-the-art facility design, construction, and O&M strategies. Coordination between TMWC staff and NDOW, USFWS, and BLM biologists would occur during construction and over the LOP with regard to minimizing disturbance to bighorn sheep and other species of wildlife and their habitats. TMWC would also provide funds to support a variety of postconstruction studies that would be prioritized and implemented at the discretion of NDOW.

5.5.2.4 Avifauna

As part of the development of the WGF, TMWC is proposing to conduct preconstruction surveys during migratory bird nesting and breeding season. According to the USFWS, the breeding and nesting season for migratory birds in this area is from March to September. A preconstruction survey of migratory bird nests would be conducted by qualified biologists prior to the initiation of land clearing. Best efforts would be made to schedule land-clearing activities outside of the breeding season, if possible. To be in compliance with the MBTA if active nests were located, the USFWS would be contacted and the nests would be avoided entirely until the chicks fledge.

Siting guidelines can be an important factor in reducing avian mortality. Siting guidelines from California (California Energy Commission 1982), Oregon (Sadler et al. 1984), Wisconsin (Wisconsin Department of Natural Resources 1995), and Britain (Royal Society for the Protection of Birds 1994) all suggest not siting WGFs near wilderness areas, national parks, critical habitat for endangered or threatened species, major migration concentrations, areas of national or international importance, bird sanctuaries, marshes and water bodies (Dillon Consulting Limited 2000). Micrositing can also play a role in reducing avian risk. Micrositing includes the position of WTGs relative to a ridge, spacing between turbines, distance from potential perch and nest sites, and WTG locations relative to vegetated gullies or water sources. Other factors such as turbine type (fixed speed or variable speed), tower design (tubular or lattice), WTG height, length of rotor blade, and amount of overhead electrical lines can also play a role in reducing avian risk at WGFs.

The proposed action is incorporating known measures into the project design that will reduce avian risk. One important measure is reducing perching opportunities by using tubular towers and burying electric collection

lines. The use of fixed-speed turbines also reduces avian risk by turning at lower speeds than the variable-speed turbines.

Preemptive mitigation measures include constructing facilities within the WGF to minimize impacts on raptors. Collision with electrical and guy wires caused 18% of the raptor deaths in Altamont Pass, California (Orloff and Flannery 1992). Under the Proposed Action or alternatives, the electric distribution lines would be constructed as recommended by Olendorff et al. (1996) to eliminate the potential for raptor electrocution. Distribution lines would be periodically monitored for avian collisions. If high collision rates are recorded, conductors in these areas would be marked.

Distribution line structures would be equipped with antiperching devices. Raptors that frequently perch on or near WTGs may habituate to WTGs, resulting in a decreased awareness of danger (Orloff and Flannery 1992). Antiperching devices have not been tested, and effects of habituation to WTGs on raptor mortality remain unknown.

Food availability may potentially limit raptor populations. Impacts of the Proposed Action or alternatives on prey availability are unknown, but could be monitored with postconstruction avian mortality studies, if deemed necessary by NDOW.

Postconstruction avian studies to monitor avian risk and mortality for a period of 1 or 2 years could be recommended by NDOW and supported with funding from TMWC. The monitoring could focus on avian collisions and mortality and identify which, if any, of the WTGs are resulting in fatalities. If certain WTGs are causing mortalities, state-of-the-art mitigation techniques could be employed to reduce the risk of avian collisions.

5.5.2.5 Bats

Facilities within the WGF would be constructed to minimize known impacts, such as collision and electrocution, on bat species. Much of the electrical distribution line would be buried beneath the ground surface, minimizing collision potential.

WGFs would be constructed to minimize disturbance on existing mines and caves that may serve as roosts (bachelor, maternity, or hibernacula). Due to the sensitivity of these species to the presence of human beings, particularly around or in maternity roosts, areas known to be inhabited by bats should be avoided. Project roads that traverse areas with roosts would be posted with appropriate traffic signage. If identified as roosts, cave and abandoned mine entrances could be fitted with bat gates that would exclude people while allowing free passage of bats. Additionally, fences could be built around the entrances according to Nevada Department of Mines standards, if deemed necessary by NDOW.

Nighttime lighting of the WGF and ancillary facilities would be kept to a minimum public safety level to avoid attracting insects and bats to the WTGs.

NDOW and the USFWS could implement postconstruction surveys for bats in conjunction with postconstruction avian studies. Postconstruction efforts could also involve acoustic surveys, biannual flyway surveys, and monitoring of bat risk and mortality associated with the O&M of the WGF.

5.5.2.6 Other Wildlife

The banded Gila monster is a sensitive reptile species that may be impacted during construction and O&M of the proposed project. Any banded Gila monsters or chuckwallas encountered would be immediately reported to NDOW. Live Gila monsters would be held for NDOW inspection and possible pit tagging. Once tagged, the reptiles would be relocated away from construction activity into nearby suitable habitat. To safely relocate this species, they would be captured and detained in a cool, shaded environment by the on-site biologist. Dead [illegible] fixed-speed [illegible] than the variable-speed turbines.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] Bats

[illegible]

[illegible]

[illegible] and lines to the WTGs.

[illegible] and the USFWS could [illegible] post-construction [illegible] with [illegible]

[illegible] Other WECs

[illegible]

Gila monsters would be preserved frozen for NDOW. Off-road vehicle travel would be restricted, and construction employees would be provided with education about these species by the project biologist.

5.6 Cultural Resources

An assessment of the impacts on cultural resources due to the implementation of the Proposed Action and the mitigation measures to address those impacts is unable to be made at this time. Once the SHPO has made NRHP eligibility determinations about all potentially impacted cultural sites and a determination has been made on the presence of TCPs within the project area, mitigation and monitoring measures will be defined for the Proposed Action or alternatives, as appropriate, and outlined in the FEIS.

5.7 Transportation

To minimize impacts on commuters and school buses, construction vehicles traveling on SH 161 and Sandy Valley Road would be limited during the morning and late afternoon commute time. With this measure, impacts would not be significant and no mitigation would be necessary to maintain acceptable operating LOS. TMWC would coordinate further with BLM and Clark County prior to making improvements to existing unpaved roads and the construction of new roads.

5.8 Climate and Air Quality

Automobiles, trucks, construction equipment, and emergency generators used on-site would be routinely maintained so that combustion is efficient and emissions of criteria pollutants are minimized. Furthermore, diesel-fueled equipment would not be allowed to idle for more than 15 minutes, unless the engine must be in the idle mode for the equipment to perform its function.

Clark County air quality regulations prohibit idling the engine of a diesel-fueled truck for more than 15 consecutive minutes, unless the engine must be at idle to perform a specific task. Exempt actions would include well drilling, trenching, or hoisting. During an air pollution emergency episode declared by the Clark County Health District, exempt actions engines shall not be at idle for more than 15 consecutive minutes.

Prior to initiating any construction actions, TMWC would be required to obtain a Dust Control Permit from the Clark County Health District. The Clark County Health District has recently adopted regulations that establish fugitive dust control standards and define reasonable precautions for the prevention and control of fugitive dust from construction activities. Additionally, specific control options for soil disturbance and trenching activities must be selected from the Section 94 Handbook developed by the Clark County Health District (Clark County 2000). These control options are selected on site-specific project conditions and logistics. Mitigation techniques (described below) that would be implemented on this proposed project to minimize fugitive dust emissions are consistent with the requirements of the Clark County Health District.

Access to the construction-site during all construction phases would be limited. As soon as practicable, permanent parking areas, access roads to the site, and permanent on-site roads would be paved with gravel. Roads would be routinely watered to keep dust generation to a minimum. Speed-limit signs would be posted to reduce vehicular speeds on the roads to reduce fugitive dust emissions.

Antitracking stations consisting of 2- to 4-in rock base would be used to control tracking from the site onto roadways. Access to the staging areas would be limited, and the staging areas would be paved with aggregate. On-site vehicular traffic speeds would be limited to less than 15 mph.

Workers would be trained to properly handle construction materials (sand, cement powder, etc.) to minimize fugitive dust emissions from use of these materials. No outside mixing of these materials would be done on days when wind speed exceeds 15 mph.

Land that is not active after cutting, filling, or grading would be stabilized (see the Reclamation Plan that will be included in the FEIS and POD), and vehicle access would be prevented. Where practical, construction activities would be staged to minimize the amount of land disturbed at any time.

Before land clearing, a water truck would be used to increase the moisture content of the soil. Depending on the type of soils encountered, chemicals may be added to the water to improve moisture retention in the soil. As earthmoving activities proceed, the water truck would work in conjunction with the earthmoving equipment to minimize fugitive dust emissions.

Excavation would be conducted in a manner similar to that used for clearing and grubbing. Before excavating materials, they would be watered so the soil is moist to the level of excavation. If caliche is present, the material would be presoaked only to the depth just above the caliche. A water truck would work in concert with the excavation equipment to minimize fugitive dust emissions.

Fill material to be used at the site would come from road cuts, foundation excavations, or off-site borrow pits. Stockpiles of this material would be periodically sprayed to form a crust on the outside of the stockpile and to maintain the stockpile at optimum moisture content. Fill materials hauled to the site would be kept below the freeboard of the truck to minimize spillage. Before loading the trucks, the truck driver would inspect gate seals and remove any debris that would prevent a tight closure. While loading the truck, the bucket would be kept close to the truck to minimize the drop height.

For filling, compacting, and grading operations, a dedicated water truck would be available to moisten material before loading, unloading, compacting, or grading activities. Operators would be instructed to implement good management techniques to minimize fugitive dust emissions. These techniques include:

- Lowering the bucket height before releasing loads
- Releasing loads slowly
- Keeping vehicle speeds less than 15 mph
- Minimizing disturbed areas.

Every effort would be made to stage construction so that disturbances are minimal. When construction is complete, areas to be restored would be revegetated.

There are minimal and insignificant air emissions associated with operation of the WGF. No additional mitigation measures would be required.

5.9 Visual Resources

Because it was determined that the Proposed Action or alternatives would be inconsistent with the VRM management objectives for the area, mitigation measures were considered that might reduce the contrast of the features of the proposed WGF and the landscape. Color was considered as a mitigation measure. For multiple reasons, use of a certain color may only have limited results, including the following:

Weekends would be [illegible]

Land that is [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- Keeping vehicle speeds [illegible]
- [illegible]

[illegible]

[illegible]

5.8 [illegible]

[illegible]

- Under the visual contrast rating of the Proposed Action, color would not result in a moderate or strong contrast.
- Color is most effective within 1,000 ft, beyond which the color becomes more difficult to distinguish.
- Color has limited effectiveness in reducing visual impacts of structures that are silhouetted against the sky.

However, using a medium-gray color may help minimize contrast, and with most landscapes and in certain weather conditions, using medium gray results in less contrast with landscape backdrops and open-sky backdrops than when using dark colors (i.e., dark browns and rust) or very light colors such as white. Therefore, a medium-gray color is recommended for the WTGs, and the final selection of color must be approved by the FAA and BLM.

Location was considered as a mitigation measure to minimize the number of visible structures; however, location was not used as a mitigation measure because the turbines must be located on ridgelines for effectiveness, and therefore, any feasible location would be just as visible as those proposed. Design was considered as a mitigation measure, and the project already incorporates visually wise design by grouping WTGs, using similar WTG models within the same area, and developing WTG strings with uniform spacing and height. Because no mitigation measures could be incorporated into the project, the impact of the Proposed Action remains significant.

To mitigate impacts of potential glare from lighting to a level that is not significant, the following measures would be incorporated:

- Prior to operation of the Proposed Action, the applicant shall submit a lighting plan for review and approval by the BLM, which should describe the locations of lighting, the purpose of lighting, the types of lights to be used, the hours of operation, and any measures incorporated to reduce glare.
- Lighting proposed to satisfy the requirements of the FAA should be consistent with the FAA Advisory Circular on Obstruction Lighting.

Measures that could be considered for the lighting plan to limit glare impacts on the surrounding areas include:

- *Minimize outdoor lighting and lighting levels.* Lighting should only be used in areas where needed. Lighting used in those areas should be operated at levels that are applicable to the use.
- *Use motion detectors.* Motion detectors may be used in areas that do not require constant lighting.
- *Use shielding and/or cutoff luminarie.* Shielding and/or cutoff luminaries should be used where applicable. These techniques direct lighting towards the area of concern and block or reduce glare to other areas were the lighting is not desired or required.
- *Avoid illumination of structures.* Where applicable, lighting should only illuminate the area of concern and should avoid illuminating structures such as the WTGs or transmission facilities that could generate glare.

Although the other components of the Proposed Action would not result in significant visual impacts, the following additional mitigation measures are required to minimize visual contrast and avoid unnecessary visual impact.

- [illegible]

- [illegible]

- [illegible]

[illegible]

[illegible]

[illegible]

- [illegible]

- [illegible]

[illegible]

- [illegible]

- [illegible]

- [illegible]

- [illegible]

[illegible]

- The alignment of proposed new roads should be designed to follow existing topography, reduce landform alteration, and minimize visibility from surrounding areas, especially KOPs.

- A nonreflective color scheme of grays, tans, greens, and/or browns shall be used for the substation so that contrast with the surrounding landscape is minimized.

- Nonspecular conductors shall be used for all overhead distribution lines.

Specifying the distribution line tower design (i.e., monopole or lattice tower) is not necessary for this project because the proposed line would not result in significant visual impacts. Furthermore, each design is associated with a unique set of benefits and impacts. For example, monopoles or H-frame structures typically result in more ground disturbance, but are generally considered more aesthetically compatible when the line is located close to a viewer. Lattice towers typically require less permanent land disturbance and are considered to result in less contrast when viewed at a distance because the openness of the structure allows it to blend into the backdrop. Lattice towers are typically used for larger transmission lines and are not usually constructed for distribution. Additionally, lattice towers provide more perching areas for birds than single-pole or H-frame designs. Since the reduction of perching sites is an important mitigation feature of the Proposed Action, lattice towers were eliminated from consideration.

Additional mitigation measures should also be implemented to reduce scarring and other land-disturbance-related impacts. Revegetation, as specified under Section 5.5, and other appropriate mitigation measures should be implemented.

5.10 Noise

Since no significant construction or O&M noise impacts from the proposed WGF are expected, no mitigation is required. To minimize noise impacts during construction, work should be performed during daytime hours and all heavy equipment and generators should include properly working mufflers. In addition, the concrete batch plants should be set up away from noise sensitive areas.

5.11 Recreation

Although there are a number of recreational opportunities available throughout the project area, it is typically of low intensity, dispersed, and with no developed recreation sites or facilities. Temporary and moderate impacts due to construction, the presence of facilities, noise, dust, odor, and increased human activities may impact visitor experiences in the short-term. During construction, TMWC and their contractors would adequately maintain roadways, use equipment mufflers, minimize disturbance areas, and implement appropriate and timely reclamation.

5.12 Land Use

Under the Proposed Action or alternatives, no significant impact on land use is expected. The Proposed Action is consistent with the BLM's development goals for the area. The reclamation of nonessential areas disturbed during construction would be accomplished in the first appropriate season after construction. Temporary impacts on existing land uses during construction, such as disruption of local traffic and dust, would require coordination between TMWC, their contractors, the BLM, existing ROW holders, and the owners of private inholding regarding access and construction scheduling to minimize these disruptions.

[illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

8.10 Noise

[illegible]

8.11 Recreation

[illegible]

8.12 Land Use

[illegible]

5.13 Public Services, Utilities, and Electric and Magnetic Fields

Under the Proposed Action, no significant impacts on public services or utilities are expected. A small, but insignificant increase in the potential demand for emergency services from the towns of Goodsprings, Sandy Valley, and Jean could occur. Employees of the proposed WGF would be trained to respond to emergency situations including fires and potential health risks to minimize these impositions. Significant impacts from EMFs are not expected.

5.14 Hazardous Materials

Under the Proposed Action, no significant impacts from hazardous materials are expected. Hazardous materials used, transported, stored, and disposed of as a component of this project would be in accordance with all federal and state rules and regulations.

Any hazardous material spills would be handled as specified in the Spill Prevention Control Plan. TMWC and their contractors would be responsible for reporting spills of hazardous materials and implementing applicable procedures, monitoring, and reporting requirements.

Refuse would be hauled to state-approved sanitary landfills or other disposal sites. TMWC would store refuse that is collected on-site in containers prior to transport.

5.15 Socioeconomics

Implementation of the Proposed Action would result in temporary, short-term beneficial effects to Clark County employment. The Proposed Action would also provide a small number of jobs for Clark County residents during WGF operation, a minimal but long-term beneficial effect. The Proposed Action would provide short-term beneficial effects to the communities of Jean and Sandy Valley, as some of the construction workers are expected to make incidental purchases in these communities during the course of project construction. No mitigation is required for these beneficial impacts.

5.16 Environmental Justice

No environmental justice concerns have been identified in association with the Proposed Action or alternatives. Therefore, no mitigation measures are required.

6.0 CONSULTATION AND COORDINATION

On December 29, 2000, the BLM issued a NOI to prepare an EIS; to provide notice of EIS public scoping meetings for construction of an array of WTGs and ancillary facilities and other power generating facilities in the Table Mountain area of Clark County, Nevada; to request statements of interest in acquiring a ROW for an array of WTGs and ancillary facilities; and to request other potential applications for power generating facilities not known to BLM in the same area. The NOI provided a description of the scoping process and the major issues that, at a minimum, would be addressed in the EIS including air quality, geology and soils, surface and groundwater resources, biological resources, archeological and cultural resources, socioeconomic conditions, land use, and environmental justice. The NOI included a request for comments on the Proposed Action and announced the date, time, and location of three public meetings. The first round of public scoping meetings was held to solicit comments on the project and identify issues that should be addressed in the EIS.

In February 2001 the BLM, through a competitive ROW process, awarded Table Mountain Wind Company, LLC, the opportunity to submit for a ROW grant to develop a wind-powered generation facility and ancillary facilities on public land for the Table Mountain Wind Generating Facility. Presentations of the Proposed Action were made at the second round of public scoping meetings held in Goodsprings, Las Vegas, and Sandy Valley, respectively, on February 27, 28, and March 1, 2001. No alternatives in addition to those already under consideration were proposed as a result of this public scoping process. The BLM will select a Preferred Alternative after a 30-day public review of the Final EIS.

6.1 Public Scoping Meetings

Scoping is the process to learn the concerns of individuals, organizations, and agencies about a proposed project. Scoping is an integral part of the NEPA review process because it allows interested parties to participate in developing a list of issues that will be discussed in an EIS.

The first scoping meetings were held at the Clark County Government Center on January16, 2001; the Sandy Valley Community Center on January 17, 2001; and the Goodsprings Community Center on January 18, 2001. They were held in the form of an "open house," giving each entity filing a letter of interest the opportunity to present informational brochures, models, or other presentations addressing their planned facilities. The public was encouraged to ask questions and provide comments or voice concerns. Public comment forms were available at the meetings, and the public was encouraged to complete and return them to the BLM.

A second round of public scoping meetings was held in the same three communities: the Goodsprings Community Center on February 27, 2001; the Clark County Government Center on February 28, 2001; and the Sandy Valley School on March 1, 2001. They consisted of a presentation by BLM, TMWC, and the applicant's consultant, PBS&J. The presentations discussed BLM's role in the project, the project description, and the EIS/NEPA process. An open forum followed the presentation, allowing the public to ask questions and voice comments and concerns. Public comment forms were made available, and the public was urged to complete them and return them to the BLM.

6.1.1 Public Comments

Comments received during the scoping meetings and through written communication included the concerns and suggestions described below.

6.1.1.1 Water Resources

- Source of water and long-term need.

- Efficient water use.
- Wastewater discharge.

6.1.1.2 Biological Resources

- Potential effects to the birds protected under the Migratory Bird Treaty Act, raptors, sensitive bat species, and desert bighorn sheep.
- Postconstruction impacts on wildlife habitat.

6.1.1.3 Visual Resources

- Visual aesthetics could be impacted depending on WTG placement.
- Lighting of WTGs at night could impact aviation, wildlife, and surrounding residents.
- Paint the WTGs to blend in with the surrounding landscape.

6.1.1.4 Air Quality

- Dust control after construction.

6.1.1.5 Socioeconomics

- Potential impacts on local property values.
- Potential impacts on population growth.
- Employment opportunities being available to local hires.
- Power generated at the proposed WGF remaining within the Nevada grid.
- Valley Electric Association's involvement and impacts of the proposed project on their rate structure and transmission system capacity.
- Revenue(s) from the WGF being returned to the community.
- Overall benefit of the project on local communities.
- Potential for WGF to expand in the future if initial effort is successful.
- Source of funding and life span of the proposed project.

6.1.1.6 Facility Alternatives

- What other sites have been studied as an alternative for the WGF.
- Proposed site is not part of BLM disposal lands.
- Potential for solar energy development within the WGF.

6.1.1.7 Distribution Lines

- Distribution line connections from one energy generation area to another with overhead versus underground distribution lines.

6.1.1.8 Access Roads and Traffic

- Standards applied and responsibility for road maintenance and improvements.
- Impacts on public access of the project area.
- Impacts of road improvements and new road construction on soil stability.
- Increased traffic congestion through the project area.

6.1.1.9 Noise

- Sound frequency ranges of operational WTGs.

6.1.1.10 Cultural Resources

- Use of a nonlocal group to assist with assessments of impacts on cultural and historical resources within the project area.

6.1.1.11 Recreation

- Increased recreational use of the project area due to upgrading of roads.
- Access to the project area for recreational uses postconstruction.
- Impacts of the project area on public access.

6.1.1.12 Public Safety

- Fire management issues.
- Accessibility of the WGF to the general public postconstruction.
- Impacts on commercial and private aviation and air traffic.
- Design considerations for earthquakes.
- Potential for hazardous materials spills/leaks.
- Implementation of OSHA fire and safety regulations.
- Potential for ground vibration impacts/harmonics.

6.1.1.13 Facilities/Equipment

- Life expectancy, O&M schedule, and total number of WTGs to be installed.
- Amount of land disturbance.
- Types of chemicals used in WTGs and ancillary facilities.

- Project closure plan.

6.2 Project Management Team

An interdisciplinary team was formed among the lead and cooperating agencies, the project proponents, and the DEIS preparers. The team met regularly to discuss the DEIS, review interim work products, and provide guidance and direction for preparing the DEIS and other permit applications. Meetings were held monthly or when determined appropriate. Although attendance at the team meeting varied according to topics to be discussed, the team itself was formed with individuals from the following entities:

- Bureau of Land Management, Las Vegas Field Office, Las Vegas, Nevada
- Global Renewable Energy Partners, San Diego, California
- PBS&J, Henderson, Nevada
- HRA, Inc., Las Vegas, Nevada
- Ninyo & Moore, Las Vegas, Nevada
- San Bernadino County Museum, San Bernadino, California
- Nevada Division of Wildlife, Las Vegas, Nevada

6.3 Agency Coordination

The agency representatives listed below were consulted during the preparation of this DEIS. Specific references citing these individuals, as appropriate, are provided in the text of this document.

6.3.1 Federal

United States Bureau of Land Management, Las Vegas, Nevada
Mark Morse, Field Office Manager
Jerry Crockford, Washington Office Project Manager
Rex Wells, Assistant Field Manager, Division of Lands
Anna Wharton, Las Vegas Field Office Project Manager
Michael Johnson, Geologist
Donn Siebert, Wilderness and Visual Resource Management
Bob Bruno, Recreation
Gary McFadden, Wild Horse and Burro Program
Roy Lee, Range
Jeff Steinmetz, Environmental Protection Specialist
Walter "Buzz" Todd, Geologist
Gayle Marrs-Smith, Botanist
Kristen Murphy, Wildlife Biologist
Jack Norman, Soil, Water, Air Specialist
Michael Moran, Hazardous Materials
Stanton Rolf, Archeologist

United States Department of Agriculture, Natural Resources Conservation Service, Las Vegas, Nevada

Doug Merkler, Soils Specialist

United States Environmental Protection Agency, Region IX

Terry Oda, Chief
Steven Branoff, Environmental Engineer
Eugene Bromley, Environmental Engineer

United States Fish and Wildlife Service, Las Vegas, Nevada Office

Janet Bair, Assistant Field Supervisor
Michael Burroughs, Wildlife Biologist
Jeri Krueger, Wildlife Biologist
Cynthia Martinez, Fisheries and Wildlife Biologist

6.3.2 State

State of Nevada Division of Wildlife, Region 3, Las Vegas, Nevada

Brad Hardenbrook, Supervisory Biologist
Chris Tomlinson, Wildlife Biologist
Pat Cummings, Wildlife Biologist

State of Nevada Historic Preservation Office, Carson City, Nevada

Rebecca Palmer, Historic Preservation Specialist

6.3.3 County

Clark County Regional Flood Control District, Clark County, Nevada

Tim Sutko, Senior Hydrologist

6.3.4 Other

Valley Electric Association, Pahrump, Nevada

Bill Matheson, P.E.

Electrical Consultants, Inc., Billings, Montana

Dale M. Broveak, E.E.

6.4 Permits

Further agency coordination would be conducted to acquire the permits and approvals required to construct and operate the proposed Table Mountain WGF. Table 1-1 (p. 1-3) (in Chapter 1 of this DEIS) summarizes the agency-regulated activities and required federal, state of Nevada, and Clark County permits and approvals anticipated to construct and operate the Proposed Action or Alternative A or B.

United States Department of [illegible], [illegible] Las Vegas, Nevada

[illegible]

United States Environmental Protection Agency, Region IX

[illegible]

United States [illegible] Las Vegas, Nevada [illegible]

[illegible]

6.4.2 [illegible]

State of Nevada [illegible] Las Vegas, Nevada

[illegible]

State of Nevada [illegible] Carson City, Nevada

[illegible]

6.4.3 [illegible]

Clark County [illegible] Clark County, Nevada

[illegible]

6.4.4 [illegible]

[illegible]

[illegible]

6.5 [illegible]

[illegible]

7.0 LIST OF PREPARERS

The people named below contributed to the review and preparation of the Table Mountain Wind Generating Facility DEIS.

Reviewers

Bureau of Land Management
Las Vegas, Nevada

Mark Morse
Field Office Manager

Jerry Crockford
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Rex Wells
Assistant Field Manager, Division of Lands

Anna Wharton
Las Vegas Field Office Project Manager

Jeff Steinmetz
Environmental Protection Specialist

Michael Johnson
Geologist

Walter "Buzz" Todd
Geologist

Gayle Marrs-Smith
Botanist

Kristen Murphy
Wildlife Biologist

Jack Norman
Soil, Water, Air Specialist

Donn Siebert
Wilderness and Visual Resource Managemnet

Michael Moran
Hazardous Materials

Stanton Rolf
Archeologist

Bob Bruno
Recreation

Gary McFadden
Wild Horse and Burro Program

Roy Lee
Range

State of Nevada Division of Wildlife, Region 3
Las Vegas, Nevada

Brad Hardenbrook
Supervisory Biologist

Contributors

Name/Title	Education/Experience	Involvement
PBS&J		
Gary Galbraith *Project Manager*	B.S., Wildlife Biology *18 years of experience*	Project Management
Ken MacDonald *Assistant Project Manager*	M.B.A., Business Administration B.A., Biological Sciences *13 years of experience*	Project Management
Kim Hutson *Assistant Project Manager*	M.S., Water Resources Mgmt. B.A., Planning & Public Policy *9 years of experience*	Project Management General EIS Preparation
Chuck Attardo *Senior Planner*	B.S., Biology *9 years of experience*	Noise
Darin Busby *Environmental Scientist*	B.S., Ecology and Evolution *1 year of experience*	Biological Resources
Marc Cavallaro *GIS Analyst*	B.S., Geography *4 years of experience*	Maps and Graphics
Steve Curran *Reprographics Manager*	*4 years of experience*	Document Reproduction
France Davis *Program Manager*	B.A., Political Science and Geography *23 years of experience*	Recreation and Land Use

Name/Title	Education/Experience	Involvement
Chris Gibbs *Public Outreach Coordinator*	Currently completing B.S., Business Administration *18 years of experience*	Coordination and Consultation
Christine Hitchen, P.E. *Senior Transportation Analyst*	B.S., Civil Engineering Technology *15 years of experience*	Transportation and Circulation
Kalvan Hone *GIS Analyst*	B.S., GIS Cartography *4 years of experience*	Maps and Graphics
Emily Kubovchik, P.E. *Senior Transportation Project Manager*	B.S., Civil Engineering *6 years of experience*	Transportation and Circulation
Chris Moore, P.E. *Senior Transportation Project Manager*	B.S., Civil Engineering *6 years of experience*	Socioeconomics
Devon Muto *Senior Environmental Scientist*	B.S., Conservation & Resource Studies *3 years of experience*	Visual Resources
Sharon Myers *Senior Air Quality Specialist*	Ph.D., Engineering M.S., Mechanical Engineering *21 years of experience*	Air Quality
Wendy Nelson *Senior Secretary II*	Environmental Studies	Biological Resources Document Preparation
Eddie L. Ridenour, C.E.M *Senior Environmental Scientist*	B.S., Fisheries Management and Environmental Health *15 years of experience*	Hazardous Materials, Public Services, Utilities, and Electric and Magnetic Fields
Kelly Shook *Senior Environmental Scientist*	B.A., Environmental Studies *4 years of experience*	Biological Resources
Billye Sisler *Environmental Scientist*	B.A., Environmental Studies *2 years of experience*	Surface Water Hydrology Groundwater Resources Soils
Carrie Stewart *Senior Scientist II*	B.S., Geology *12 years of experience*	Geology, Mining
Bobby Tuttle *Senior Environmental Scientist*	M.S., Biology *6 years of experience*	Biological Resources

Name/Title	Education/Experience	Involvement
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Consultants

EREMICO Biological Services Weldon, California		Biological Resources
HRA, Inc. Las Vegas, Nevada		Cultural Resources
Ninyo & Moore Las Vegas, Nevada		Hazardous Materials
San Bernardino County Museum Redlands, California		Paleontological Resources
Valley Electric Association Las Vegas, Nevada		Electrical Substation

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Chapter 3.0
Affected Environment

Section 3.1
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