BIOLOGICAL ASSESSMENT OF THE EFFECTS OF SOLAR ENERGY DEVELOPMENT ON THE U.S. BUREAU OF LAND MANAGEMENT'S PROPOSED SOLAR ENERGY ZONES

MAY 2012

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NOTATION

The following is a list of acronyms, abbreviations, and units of measure used in this document. Some acronyms used only in tables may be defined only in those tables.

GENERAL ACRONYMS AND ABBREVIATIONS

AVWS	audio visual warning system
AZGFD	Arizona Game and Fish Department
BA	Biological Assessment
BLM	Bureau of Land Management
BO	Biological Opinion
CDFG	California Department of Fish and Game
CFR	*Code of Federal Regulations*
CNDDB	California Natural Diversity Database
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DWMA	Desert Wildlife Management Area
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FAA	Federal Aviation Administration
FR	*Federal Register*
GAP	Gap Analysis Project
GHG	greenhouse gas
HTF	heat transfer fluid
NEPA	National Environmental Policy Act of 1969
NISC	National Invasive Species Council
NMDGF	New Mexico Department of Game and Fish
NP	National Park
NSTC	National Science and Technology Council
NWR	National Wildlife Refuge
PEIS	programmatic environmental impact statement
PV	photovoltaic
ROD	Record of Decision
ROW	right-of-way

SEZ	solar energy zone
SWReGAP	Southwest Regional Gap Analysis Project
UDWR	Utah Division of Wildlife Resources
U.S.	United States
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey

UNITS OF MEASURE

ac-ft	acre-foot (feet)
°C	degree(s) Celsius
cm	centimeter(s)
°F	degree(s) Fahrenheit
ft	foot(ft)
in.	inch(es)
km	kilometer(s)
km^2	square kilometer(s)
m	meter(s)
m^3	cubic meter(s)
mi	mile(s)
MW	megawatt(s)
yr	year(s)

1 INTRODUCTION

1.1 BACKGROUND

Section 7(a)(2) of the Endangered Species Act (as amended) (ESA) requires every federal agency, in consultation with and with the assistance of the Secretary of the Interior, to ensure that any action it authorizes, funds, or carries out in the United States or on the high seas is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. Section 7(b) of the ESA requires the Secretary, after conclusion of early or formal consultation, to issue a written statement (Biological Opinion [BO]) setting forth the Secretary's opinion detailing how the agency action affects listed species or critical habitat. Biological Assessments (BAs) are required under Section 7(c) of the Act if listed species or critical habitat may be present in the area affected by any major construction activity as defined in Title 50, Part 402.02 of the *Code of Federal Regulations* (50 CFR 402.02). This BA was prepared to meet the above requirements for initiating consultation and to facilitate the issuance of a BO.

1.2 PURPOSE AND FRAMEWORK OF THIS BIOLOGICAL ASSESSMENT

The purpose of this Draft BA is to assess the effects of solar energy development within designated areas on U.S. Department of the Interior (DOI) Bureau of Land Management (BLM)-administered lands in six southwestern states on federally listed and proposed species and any designated or proposed critical habitat. The six states are Arizona, California, Colorado, Nevada, New Mexico, and Utah. The areas identified to be evaluated for solar energy development in this BA are proposed solar energy zones (SEZs). Solar energy development on these proposed SEZs is considered to be part of the BLM's Proposed Solar Energy Program. A detailed description of the Proposed Solar Energy Program and associated environmental impacts is provided in the *Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States* (hereafter referred to as "Draft PEIS") (BLM and DOE 2010) and in the *Supplement to the Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States* (hereafter referred to as the "Supplement") (BLM and DOE 2011). The proposed action is summarized in Section 2 of this BA.

The SEZs considered for solar energy development may contain, or be in close proximity to, known populations, critical habitats, or potentially suitable habitats for listed species. This BA examines the potential effects of development in the proposed SEZs under the Solar Energy Program in order to facilitate U.S. Fish and Wildlife Service (USFWS; hereafter referred to as the "Service") analysis of jeopardy for ESA-listed species.

This BA, where appropriate, incorporates by reference information from the Draft PEIS and the Supplement. Information specific to the effects determination for listed or proposed species or designated critical habitat is included in this document.

1.3 DOCUMENT ORGANIZATION

This BA consists of four main parts: (1) a description of the proposed action, including required project design features and other minimization measures that will be followed to ensure compliance with the ESA; (2) a description of the process by which species were identified for inclusion in this BA, which was based on the location and characteristics of the action area and known common impacts of solar energy development on ecological resources; (3) a discussion of all species that could occur in the affected area that are federally listed as threatened or endangered or that are proposed for federal listing under the ESA (including species descriptions and potential effects of the proposed action); and (4) cumulative effects.

Section 2 of this BA provides a description of the proposed action for the purposes of this BA and a listing of the required project design features to address potential ecological impacts. Under the proposed action, the BLM would establish a Solar Energy Program that would improve the efficiency of land use decisions for utility-scale solar energy rights-of-way (ROWs) on the designated SEZs. Based upon analyses and information presented in the Supplement, approximately 285,000 acres (1,153 km^2) of BLM-administered lands have been identified as proposed SEZs in the six-state region.

The proposed action also includes required project design features to avoid or reduce impacts on environmental resources. Design features are mitigation measures that the BLM would require of any utility-scale solar energy development on the proposed SEZs.

Section 3 describes the process for identifying species for formal consultation in this BA.

Section 4 describes the geographic scope of the action area and provides a summary of common utility-scale solar energy development.

Section 5 discusses the impacts of utility-scale solar energy development and BLM's proposed action on ecological resources and ESA-listed species. Section 5.1 discusses general and technology-specific impacts on ecological resources, and Section 5.2 discusses anticipated effects on species that could occur in the proposed SEZ affected areas.

Section 6 presents a discussion of cumulative effects. Under the ESA, cumulative effects are considered the effects of future state, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this BA, in addition to the potential solar development assessed in this BA. Future federal actions unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

2 PROPOSED ACTION

2.1 DESCRIPTION OF THE PROPOSED ACTION

The BLM proposes to establish a new Solar Energy Program of administration and authorization policies and required design features to replace certain elements of its existing Solar Energy Policies (BLM 2007a; 2010a,b). The proposed program would be established for BLM-administered lands in six southwestern states—Arizona, California, Colorado, Nevada, New Mexico, and Utah. Not all BLM-administered lands are appropriate for solar energy development. Under the proposed action, the BLM would identify a number of SEZs within the lands available for ROW application where the BLM would prioritize solar energy and associated transmission infrastructure development. The proposed SEZs are shown in Figures 2-1 through 2-6 and listed by state with acreage, BLM field office, and county in Table 2-1. Approximately 285,000 acres (1,153 km^2) have been identified as proposed SEZs.

The process of identifying SEZs was undertaken by the BLM state and field offices. Characteristics of SEZs that made them more suitable for solar energy development include proximity to existing transmission or designated corridors and roads, slopes of 1 to 2% or less, and a minimum of 2,500 acres (10.1 km^2) in size. The exclusion areas listed in Table 2-2 were used to determine lands available for ROW application, as well as the proposed SEZs.[1] Additional filters were also applied by the field office staff based on local conditions, institutional knowledge, and coordination efforts.

Through the Record of Decision (ROD) for the Final PEIS, the BLM may decide to carry forward some or all of the proposed SEZs as part of the agency's Solar Energy Program. Further, the Secretary of the Interior may decide to withdraw the public lands encompassed in the SEZs from potentially conflicting uses through the issuance of a Public Land Order.

The proposed Solar Energy Program would also establish comprehensive program administration and authorization policies and design features to be applied to all utility-scale solar energy projects on BLM-administered lands in the six-state action area. The BLM would establish additional SEZ-specific design features to address SEZ-specific resource conflicts. Collectively, these design features represent the most widely accepted methods to avoid and/or minimize potential impacts from the types of activities associated with solar energy development and to successfully administer solar energy development on public lands.

Under the proposed Solar Energy Program, individual ROW applications would continue to be evaluated on a project-by-project basis; however, the BLM proposes that these evaluations would tier to the programmatic analyses presented in the Final PEIS and the decisions implemented in the resultant ROD and land use plan amendments to the extent appropriate.

[1] Data for several exclusion categories could not be mapped because of the lack of data. Exclusion areas that could not be mapped would be identified during pre-application consultations with local BLM staff or site-specific evaluation of individual ROW applications.

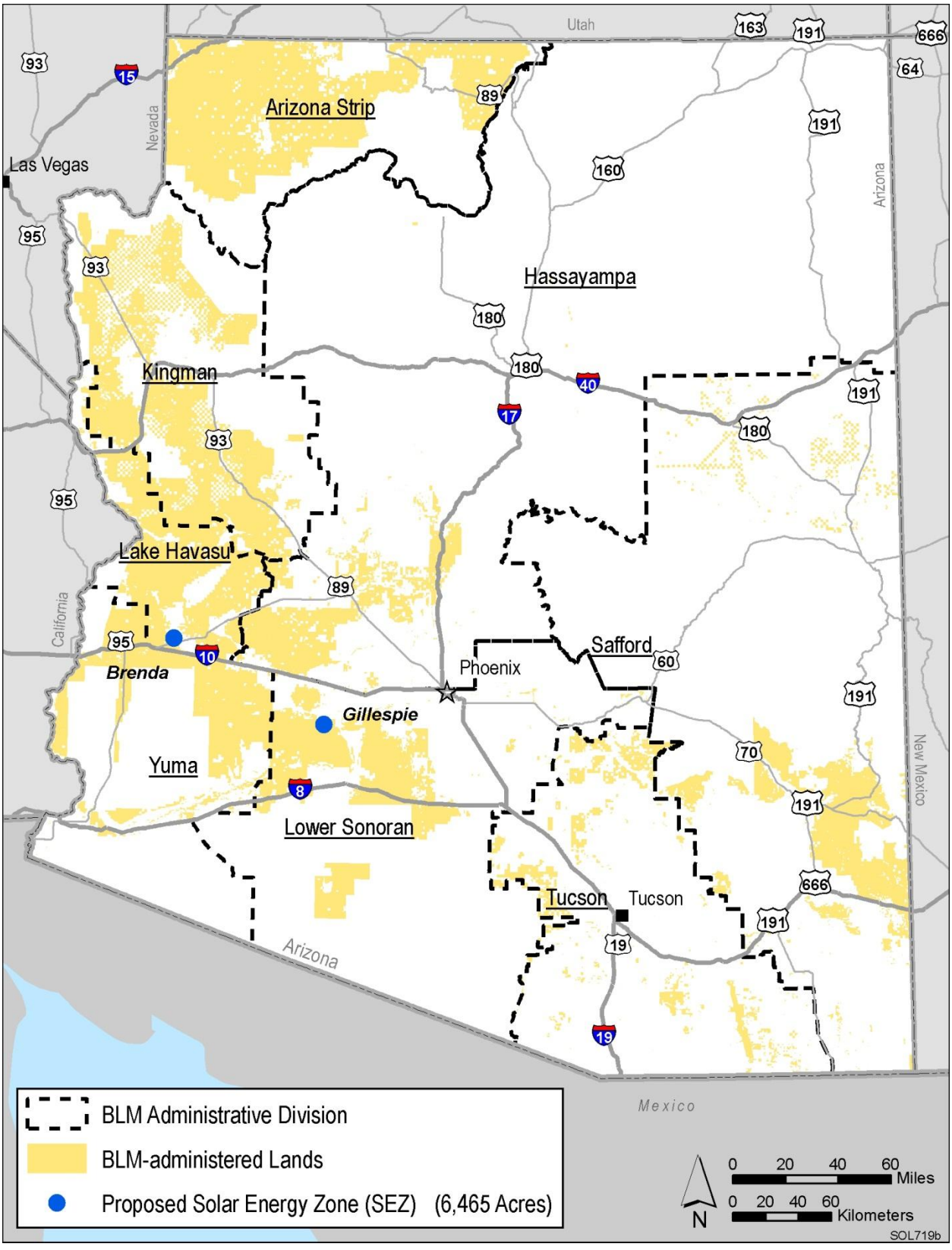

FIGURE 2-1 BLM-Administered Lands and Proposed SEZs in Arizona

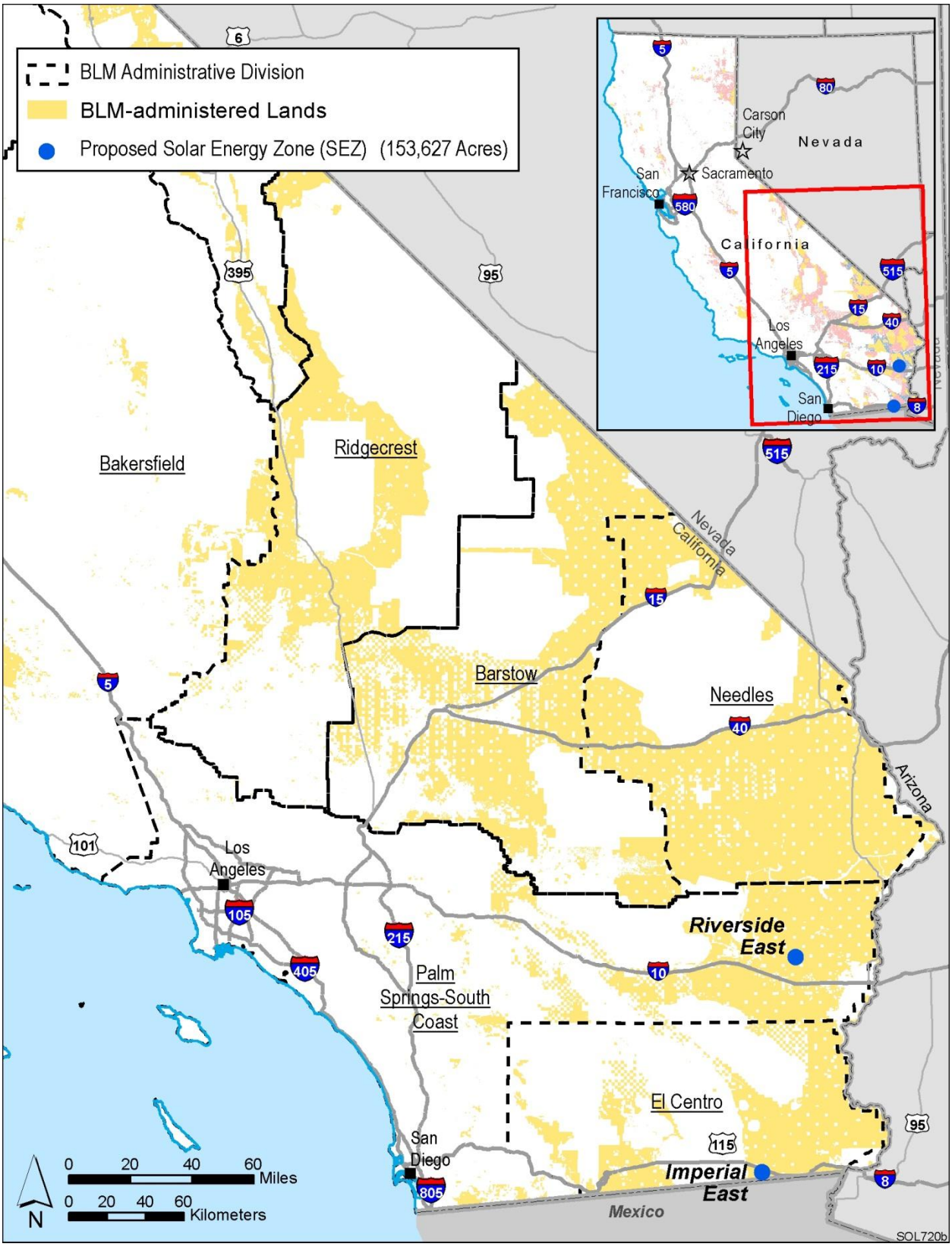

FIGURE 2-2 BLM-Administered Lands and Proposed SEZs in California

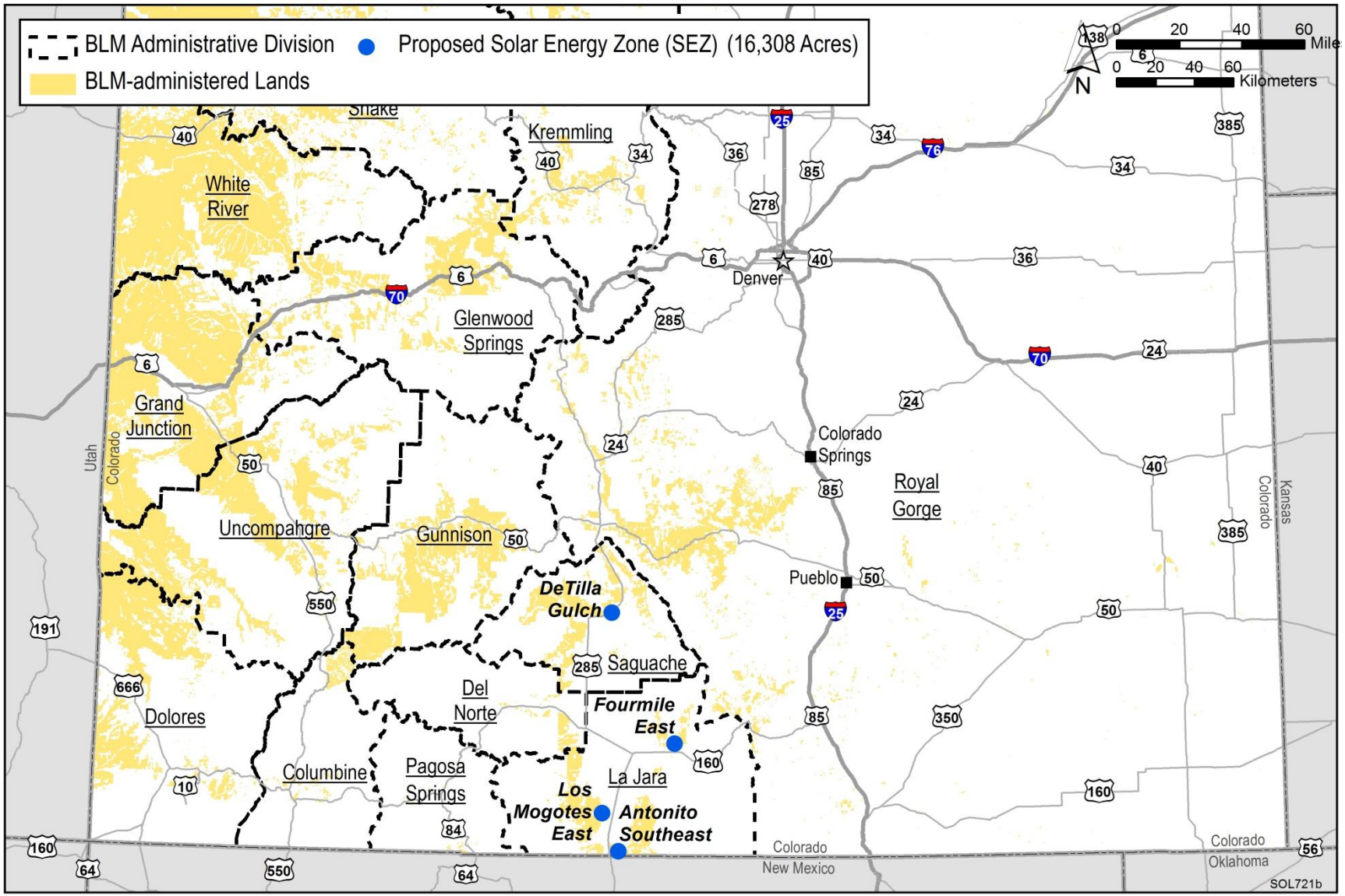

FIGURE 2-3 BLM-Administered Lands and Proposed SEZs in Colorado

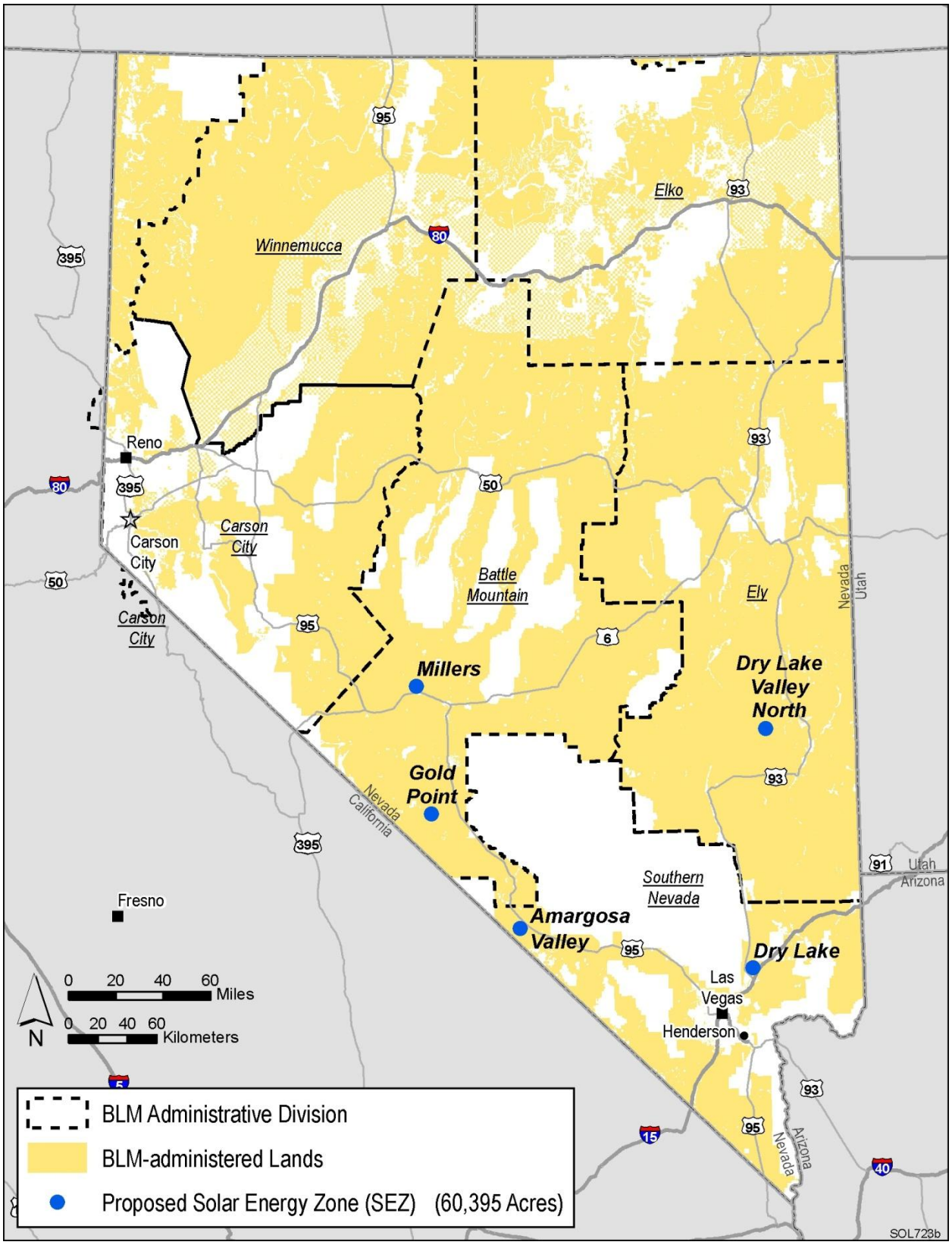

FIGURE 2-4 BLM-Administered Lands and Proposed SEZs in Nevada

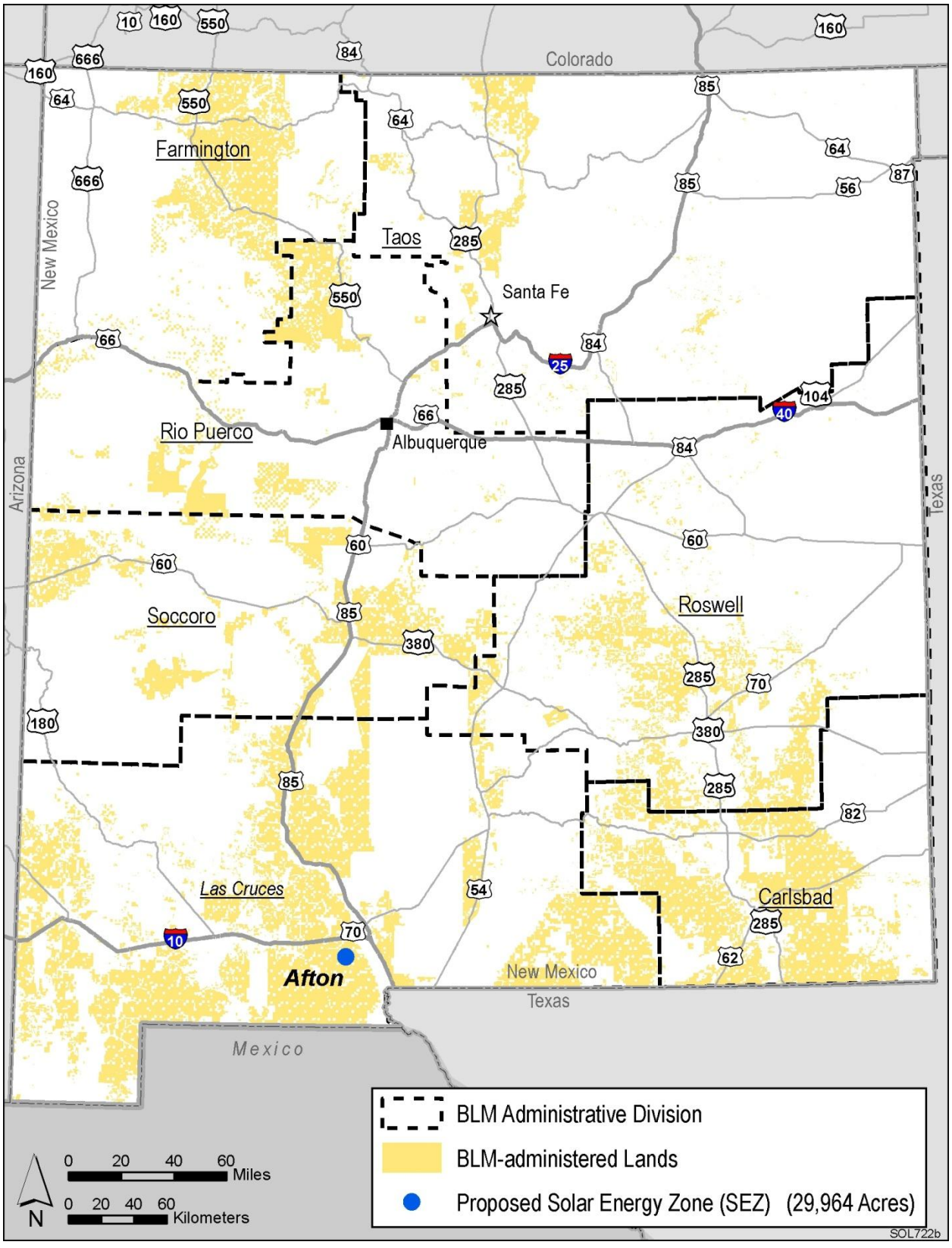

FIGURE 2-5 BLM-Administered Lands and Proposed SEZs in New Mexico

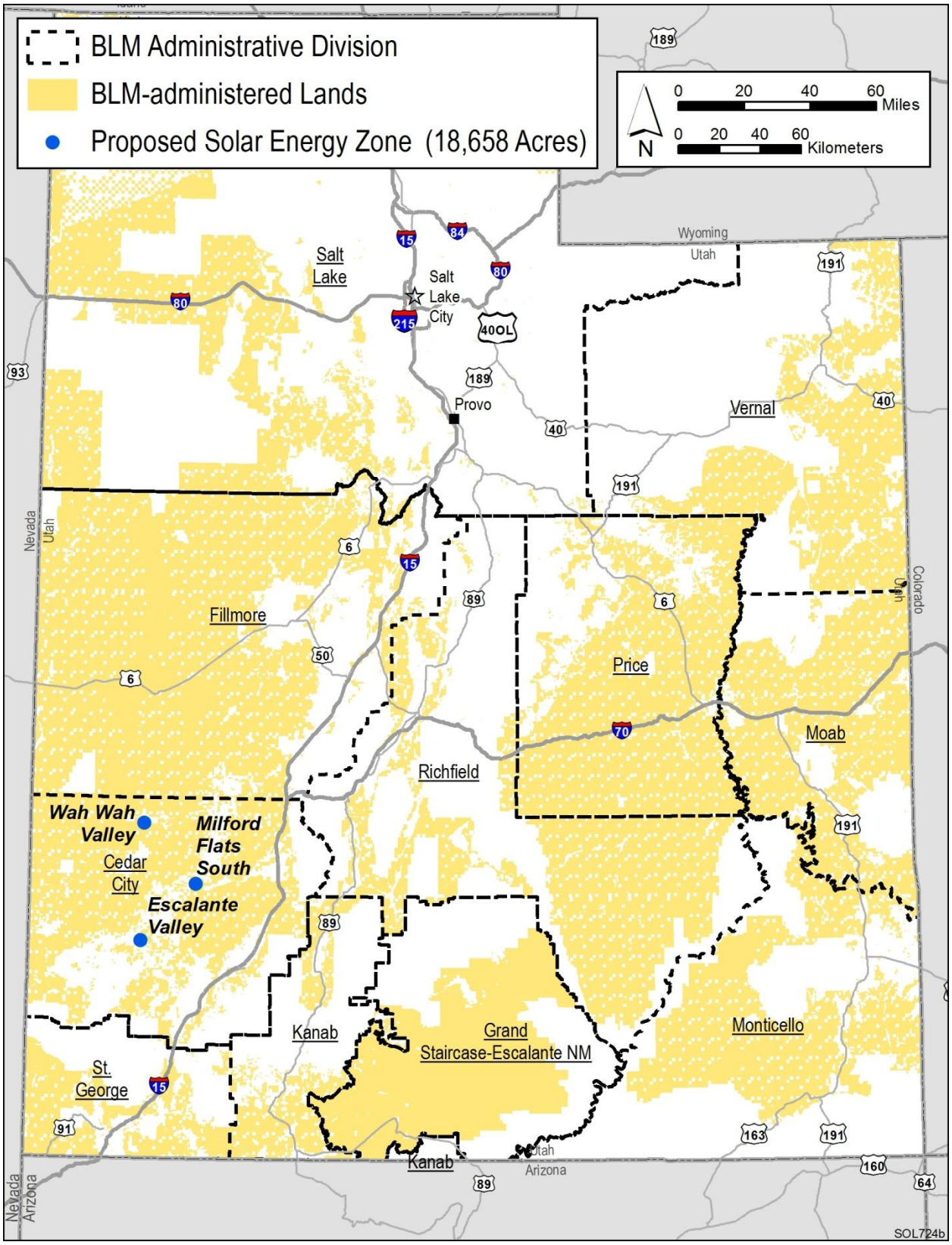

FIGURE 2-6 BLM-Administered Lands and Proposed SEZs in Utah

TABLE 2-1 Proposed SEZs and Approximate Acreage by State[a]

Proposed SEZ (BLM Office/County)	Total SEZ Approximate Acreage	Developable Area Approximate Acreage
Arizona		
Brenda (Lake Havasu/La Paz)	3,878	3,847
Gillespie (Lower Sonoran/Maricopa)	2,618	2,618
Total	6,496	6,465
California		
Imperial East (El Centro/Imperial)	5,722	5,717
Riverside East (Palm Springs–South Coast/Riverside)	159,457	147,910
Total	165,179	153,627
Colorado		
Antonito Southeast (La Jara/Conejos)	9,729	9,712
De Tilla Gulch (Saguache/Saguache)	1,064	1,064
Fourmile East (La Jara/Alamosa)	2,883	2,882
Los Mogotes East (La Jara/Conejos)	2,650	2,650
Total	16,326	16,308
Nevada		
Amargosa Valley (Southern Nevada/Nye)	9,737	8,479
Dry Lake (Southern Nevada/Clark)	6,186	5,717
Dry Lake Valley North (Ely/Lincoln)	28,726	25,069
Gold Point (Battle Mountain/Esmeralda)	4,810	4,596
Millers (Battle Mountain/Esmeralda)	16,787	16,534
Total	66,246	60,395
New Mexico		
Afton (Las Cruces/ Doña Ana)	30,706	29,964
Total	30,706	29,964
Utah		
Escalante Valley (Cedar City/Iron)	6,614	6,533
Milford Flats South (Cedar City/Beaver)	6,480	6,252
Wah Wah Valley (Cedar City/Beaver)	6,097	5,873
Total	19,191	18,658
Total	304,144	285,417

[a] To convert acres to km^2, multiply by 0.004047.

TABLE 2-2 Revised Areas for Exclusion under the BLM's Solar Energy Development Program

1. Lands with slopes greater than 5%.
2. Lands with solar insolation levels less than 6.5 kWh/m^2/day.
3. All Areas of Critical Environmental Concern (ACECs), including Desert Wildlife Management Areas (DWMAs) in the California Desert District.
4. All critical habitat areas (designated and proposed) for listed species under the Endangered Species Act of 1973 (as amended).
5. All areas where the applicable land use plan designates no surface occupancy (NSO).
6. All areas where there is an applicable land use plan decision to protect lands with wilderness characteristics.
7. Developed recreational facilities, special-use permit recreation sites (e.g., ski resorts and camps), and all Special Recreation Management Areas (SRMAs), except for those in the State of Nevada and a portion of the Yuma East SRMA in Arizona.[a]
8. All areas where solar energy development proposals are not demonstrated to be consistent with the land use management prescriptions for or where the BLM has made a commitment to take certain actions with respect to sensitive species habitat, including but not limited to sage grouse core areas, nesting habitat, and winter habitat; Mohave ground squirrel habitat; flat-tailed horned lizard habitat; and fringe-toed lizard habitat. Greater sage-grouse habitat as identified by the BLM is excluded in California, Nevada, and Utah, and Gunnison's sage-grouse habitat is excluded in Utah.[b]
9. All ROW exclusion areas identified in applicable plans other than those specific to utility-scale solar energy development.
10. All ROW avoidance areas identified in applicable plans other than those specific to utility-scale solar energy development.
11. All areas where the land use plan designates seasonal restrictions.
12. All Desert Tortoise translocation sites identified in applicable land use plans.
13. Big Game Migratory Corridors identified in applicable land use plans.
14. Big Game Winter Ranges identified in applicable land use plans.
15. Research Natural Areas.
16. Lands categorized as Visual Resource Management (VRM) Class I or II (and, in Utah, Class III[c]).
17. National Recreation Trails and National Back Country Byways.
18. National Historic and Scenic Trails, including a corridor of 0.25 mi (0.4 km) from the centerline of the trail, except where a corridor of a different width has been established.

TABLE 2-2 (Cont.)

19. National Historic and Natural Landmarks.

20. Within the boundary of properties listed in the *National Register of Historic Places* and additional lands outside the designated boundaries to the extent necessary to protect values where the setting and integrity is critical to their designation or eligibility.

21. Areas with important cultural and archaeological resources, such as traditional cultural properties and Native American sacred sites, as identified through consultation and recognized by the BLM.

22. Wild, Scenic, and Recreational Rivers, including a corridor of 0.25 mi (0.4 km) from the ordinary high-water mark on both sides of the river, except where a corridor of a different width has been established.

23. Segments of rivers determined to be eligible or suitable for Wild or Scenic River status, including a corridor of 0.25 mi (0.4 km) from the ordinary high-water mark on either side of the river.

24. Old Growth Forest.

25. Lands within a solar energy development application found to be inappropriate for solar energy development through an environmental review process that occurred prior to finalization of the Draft Solar PEIS.[d]

26. Lands previously proposed for inclusion in SEZs that were determined to be inappropriate for development through the NEPA process (i.e., the previously proposed Iron Mountain SEZ area; parts of the Pisgah and Riverside East SEZs in California; parts of the De Tilla Gulch, Fourmile East, and Los Mogotes East SEZs in Colorado; and parts of the Amargosa Valley SEZ in Nevada).

27. Lands within the proposed Mojave Trails National Monument in California.[e]

28. BLM-administered lands in California proposed for transfer to the National Park Service with the concurrence of the BLM.[f]

29. Individual additional areas identified by BLM state or field offices as requiring exclusion due to ecological or cultural concerns.

[a] In Nevada, many designated SRMAs are located on semi-degraded lands that might be appropriate for solar development. Decisions on solar ROW applications within Nevada SRMAs will be made on a case-by-case basis. A portion of the Yuma East SRMA was identified as a variance area rather than as an exclusion area based on its designation as VRM Class III and as a rural developed recreation setting, both of which allow for modifications to the natural environment.

[b] In April 2010, the Service published its listing for the greater sage-grouse as "Warranted but Precluded." Inadequacy of regulatory mechanisms was identified as a major threat in the Service finding on the petition to list the greater sage-grouse. The Service has identified the principal regulatory mechanism for the BLM as conservation measures in Resource Management Plans (RMPs). On the basis of the identified threats to the greater sage-grouse and the Service's time line for making a listing decision on this species, the BLM has initiated action to incorporate explicit objectives and adequate conservation measures into RMPs (including PEISs and project EISs) within the next 3 years in order to conserve greater sage-grouse and avoid a potential listing under the ESA. To meet the objectives of BLM's sage-grouse conservation policy, the Solar PEIS has excluded specifically identified sage-grouse habitat (currently occupied, brooding, and winter habitat) located on BLM public lands in Nevada and Utah.

Footnotes continued on next page.

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TABLE 2-2 (Cont.)

[c] In Utah, VRM Class III lands have also been removed due to the high sensitivity and location proximity to Zion, Bryce, Capital Reef, Arches, and Canyonlands National Parks, and to significant Cultural Resource Special Management Areas (in southeast Utah).

[d] For example, lands considered nondevelopable in the environmental review for the Ivanpah Solar Electric Generating System, Imperial Valley Solar Project, Calico Solar Project, Genesis Ford Dry Lake Solar Project, Blythe Solar Project, and Desert Sunlight Solar Project.

[e] As described in Senate Bill 138, California Desert Protection Act of 2011, introduced in the 112th Congress.

[f] Three specific geographic areas described as (1) the narrow strip of BLM-administered lands between Fort Irwin and Death Valley National Park, (2) an area of public lands on the northeastern side of the Mojave National Preserve adjacent to the California and Nevada border, and (3) an area along the northern boundary of Joshua Tree National Park.

Site- and project-specific data would be assessed in the individual project reviews, and impacts not adequately reduced by the program's administration and authorization policies and design features would be addressed through the implementation of additional requirements incorporated into the project Plan of Development and ROW authorization stipulations. Analysis of an application may result in a decision to deny the application.

The BLM will develop and incorporate into its Solar Energy Program an adaptive management and monitoring plan for solar energy development, in coordination with potentially affected natural resource management agencies, to ensure that data and lessons learned about the impacts of solar energy projects will be collected, reviewed, and, as appropriate, incorporated into the BLM's Solar Energy Program in the future. Changes to the BLM's Solar Energy Program resulting from adaptive management and monitoring will be subject to appropriate land use planning, environmental review, and/or policy development.

The elements of the new Solar Energy Program would be implemented through amendment of the land use plans within the six-state study area.

2.2 REQUIRED PROGRAMMATIC DESIGN FEATURES

An important element of this proposed Solar Energy Program would be the establishment of design features—measures that have been incorporated into the proposed action to avoid or reduce adverse impacts. These proposed design features would be applicable to all utility-scale solar energy projects on BLM-administered lands. They would establish a broad array of requirements applicable to each phase of development (i.e., site evaluation, construction, operation, and decommissioning) to protect natural and cultural resources, resource uses, and specially designated areas. The proposed design features that are relevant to the protection of species listed under the ESA are presented below. A complete list of design features is presented in Appendix A of the PEIS.

2.2.1 Design Features Related to Siting of Facilities

- To the extent practicable, projects will be sited on previously disturbed lands in close proximity to energy load centers to avoid and minimize impacts on remote, undisturbed lands.

- Existing access roads, utility corridors, and other infrastructure will be used to the maximum extent feasible.

- As practical, staging and parking areas will be located within the site of the utility-scale solar energy facility to minimize habitat disturbance in areas adjacent to the site.

- Appropriate agencies (e.g., the BLM, the Service, and state resource management agencies) will be contacted early in the planning process to identify the known or potential locations of federally listed threatened and endangered species and their habitats, including designated critical habitat, in the area proposed for a solar energy facility and associated access roads and ROWs. This coordination will be used to identify the need for and scope of pre-disturbance surveys of the project area and vicinity.

- All pre-disturbance surveys will be conducted by qualified biologists following accepted protocols established by the Service for the presence of listed species in the project area and to identify and delineate the boundaries of important, sensitive, or unique habitats in the project vicinity that may support listed species (e.g., springs, seeps, ephemeral streams, intermittent streams, 100-year floodplains, ponds and other aquatic habitats, riparian habitat, remnant vegetation associations, and sand dune systems).

- Projects will be sited and designed to avoid direct and indirect impacts on important, sensitive, or unique habitats in the project vicinity, including, but not limited to, waters of the United States, wetlands (both jurisdictional and nonjurisdictional), springs, seeps, streams (ephemeral, intermittent, and perennial), 100-year floodplains, ponds and other aquatic habitats, riparian habitat, remnant vegetation associations, rare or unique biological communities, crucial wildlife habitats, and habitats supporting listed species populations (including designated and proposed critical habitat). For cases in which impacts cannot be avoided, they will be minimized and mitigated appropriately. Project planning will be coordinated with the appropriate federal and state resource management agencies.

- Projects will not be sited in designated critical habitat, Areas of Critical Environmental Concern (ACECs), or other specially designated areas that are considered necessary for listed species and habitat conservation.

- Projects will be designed to avoid, minimize, and mitigate impacts on wetlands, waters of the United States, and other special aquatic sites.

- Project facilities and activities, including associated roads and utility corridors, will not be located in or near occupied habitats of listed animal species. Buffer zones will be established (e.g., identified in the land use plan or substantiated by best available information or science) around these areas to prevent any destructive impacts associated with project activities.

- Buffer zones will be established around sensitive habitats, and project facilities and activities will be excluded or modified within those areas (e.g., identified in the land use plan or substantiated by best available information or science).

- Habitat loss, habitat fragmentation, and resulting edge habitat due to project development will be minimized to the extent practicable. Habitat fragmentation will be reduced by consolidating facilities (e.g., access roads and utilities will share common ROWs, where feasible), reducing the number of access roads to the minimum amount required, minimizing the number of stream crossings within a particular stream or watershed, and locating facilities in areas where habitat disturbance has already occurred. Individual project facilities will be located and designed to minimize disruption of animal movement patterns and connectivity of habitats.

- Locating solar power facilities near open water or other areas that are known to attract a large number of birds will be avoided.

- Plant species that would attract wildlife will not be planted along high-speed or high-traffic roads.

- Tall structures will be located to avoid known flight paths of birds and bats.

- Transmission line conductors will span important or sensitive habitats within the limits of standard structure design.

- Fences will be built (as practicable) to exclude livestock and wildlife from all project facilities, including all water sites.

- Project developers will identify surface water runoff patterns at the project site and develop measures that prevent soil deposition and erosion throughout and downhill from the site.

- Developers will avoid the placement of facilities or roads in drainages and make necessary accommodations for the disruption of runoff.

- Any necessary stream crossings will be designed to provide in-stream conditions that allow for and maintain uninterrupted movement and safe passage of fish during all project periods.

- Projects will avoid surface water or groundwater withdrawals that affect sensitive habitats (e.g., aquatic, wetland, and riparian habitats) and any habitats occupied by listed species. Applicants will demonstrate, through hydrologic modeling, that the withdrawals required for their project are not going to affect groundwater elevations or discharges that support listed species or their habitats.

- The capability of local surface water or groundwater supplies to provide adequate water for the operation of proposed solar facilities will be considered early in the project siting and design. Technologies that would result in large withdrawals that would affect water bodies that support listed species will not be considered.

- New roads will be designed and constructed to meet the appropriate BLM road design standards, such as those described in *BLM Manual 9113* (BLM 1985), and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Roads internal to solar facility sites will be designed to minimize ground disturbance.

- Pipelines that transport hazardous liquids (e.g., oils) that will pass through aquatic or other habitats containing sensitive species will be designed with block or check valves on both sides of the waterway or habitat to minimize the amount of product that could be released as a result of leaks. Such pipelines will be constructed of double-walled pipe at river crossings.

2.2.2 General Design Features Related to Multiple Phases of Facility Development

- Project developers will designate a qualified biologist who will be responsible for overseeing compliance with all design features related to the protection of ecological resources throughout all project phases, particularly in areas requiring avoidance or containing sensitive biological resources, such as listed species and important habitats. Additional qualified biological monitors would be required on-site during all project phases as determined by the BLM, the Service, and appropriate state agencies.

- All personnel will be instructed on the identification and protection of ecological resources (especially for listed species), including knowledge of required design features. Workers must be aware that only qualified biologists are permitted to handle listed species according to specialized protocols approved by the Service. Workers will not approach wildlife for photographs or feed wildlife.

- The collection, harassment, or disturbance of plants, wildlife, and their habitats (particularly listed species) will be reduced through employee and contractor education about applicable state and federal laws. In addition, the following measures will be implemented: (1) all personnel will be instructed to avoid harassment and disturbance of local plants and wildlife; (2) personnel will be made aware of the potential for wildlife interactions around facility structures; (3) food refuse and other garbage will be placed in closed containers so it is not available to scavengers; and (4) workers will be prohibited from bringing firearms and pets to project sites.

- Projects will maintain native vegetation cover and soils to the extent possible and minimize grading to reduce flooding, maintain natural infiltration rates, maintain wildlife habitat, maintain soil health, and reduce erosion potential. All short (i.e., less than 7-in. [18-cm] tall) native vegetation will be retained to the maximum extent possible. Blading within the project site will be minimized to the maximum extent possible. Where necessary and feasible, shrub cover would be mowed and/or raked to smooth out the surface. Retention of native root structure and seeds within the project area would help retain soil stability, minimize soil erosion, and minimize fugitive dust pollution. Retention of native seed and roots within the project site will also facilitate recovery of vegetative cover. Use of native plant species will minimize the need to water the vegetation, because native species are already adapted to the local climate and moisture regime of the area.

- Plants, wildlife, and their habitats will be protected from fugitive dust through measures included in the facility's Dust Abatement Plan.

- Activities will be timed to avoid, minimize, or mitigate impacts on wildlife. If activities are planned during bird breeding seasons, a nesting bird survey will be conducted first. If active nests are detected, the nest area will be flagged, and no activity would take place near the nest (at a distance determined in coordination with the Service) until nesting is completed (i.e., nestlings have fledged or the nest has failed) or until appropriate agencies agree that construction can proceed with the incorporation of agreed-upon monitoring measures. The timing of activities will be coordinated with the BLM, the Service, and appropriate state agencies.

- Noise reduction devices (e.g., mufflers) will be employed to minimize the impacts on wildlife and listed species populations. Explosives will be used only within specified times and at specified distances from sensitive wildlife or surface waters as established by the BLM or other federal and state agencies. Operators will ensure that all equipment is adequately muffled and maintained in order to minimize disturbance to wildlife.

- Design features for hazardous materials and waste management regarding refueling, equipment maintenance, and spill prevention and response will be applied to reduce the potential for impacts on ecological resources.

- Low-water crossings (fords) will be used only as a last resort, and then during the driest time of the year. Rocked approaches to fords will be used. The pre-existing stream channel, including bed and banks, will be restored after the need for a low-water ford has passed.

- The number of areas where wildlife could hide or be trapped (e.g., open sheds, pits, uncovered basins, and laydown areas) will be minimized. For example, an uncovered pipe that has been placed in a trench would be capped at the end of each workday to prevent animals from entering the pipe. If a listed species is discovered inside a component, that component must not be moved or, if necessary, moved only to remove the animal from the path of activity until the animal has escaped.

- During all project phases, buffer zones will be established around sensitive habitats, and project facilities and activities will be excluded or modified within those areas, to the extent practicable.

- Project activities will not be located in or near occupied habitats of listed animal species. Buffer zones will be established around these areas (e.g., identified in the land use plan or substantiated by best available information or science) to prevent any destructive impacts associated with project activities.

- If any federally listed threatened and endangered species are found during any phase of the project, the Service will be consulted as required by Section 7 of the ESA, and an appropriate course of action will be determined to avoid or mitigate impacts.

- Access roads will be appropriately constructed, improved, maintained, and provided with signs to minimize potential wildlife-vehicle collisions and facilitate wildlife movement through the project area.

- Project vehicle speeds will be limited in areas occupied by listed animal species. Traffic will stop to allow wildlife to cross roads. Shuttle vans or car pooling will be used where feasible to reduce the amount of traffic on access roads.

- Unless authorized, personnel will not attempt to move live, injured, or dead wildlife off roads, ROWs, or the project site. Honking horns, revving engines, yelling, and excessive speed are inappropriate and considered a form of harassment. If traffic is being unreasonably delayed by wildlife in roads,

personnel will contact the project biologist and security, who will take any necessary action.

- Road closures or other travel modifications (e.g., lower speed limits, no foot travel) will be considered during crucial periods (e.g., extreme winter conditions, calving/fawning seasons, or raptor nesting). Personnel will be advised to minimize stopping and exiting their vehicles in the winter ranges of large game while there is snow on the ground.

- Any vehicle collisions with listed species or other observed mortality of listed species will be immediately reported to the BLM and the Service. Observations of potential wildlife problems, including wildlife mortality, will be immediately reported to the BLM or other appropriate agency-authorized officer. Procedures for removal of wildlife carcasses on-site and along access roads will be addressed in the Nuisance Animal and Pest Control Plan, to avoid vehicle-related mortality of carrion-eaters.

- A Nuisance Animal and Pest Control Plan will be developed that identifies management practices to minimize increases in nuisance animals and pests in the project area, particularly those individuals and species that would affect human health and safety or have the potential to adversely affect native plants and animals. The plan would identify nuisance and pest species likely to occur in the area, risks associated with these species, species-specific control measures, and monitoring requirements.

- An Integrated Vegetation Management Plan will be developed that is consistent with applicable regulations and agency policies for the control of noxious weeds and invasive plant species. The plan will address monitoring; ROW vegetation management; the use of certified weed-free seed and mulching; the cleaning of vehicles to avoid introducing invasive weeds; and the education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. For transmission line ROWs, the plan will be consistent with the existing vegetation management plan for that ROW. Principles of integrated pest management, including biological controls, will be used to prevent the spread of invasive species, per *Final Programmatic Environmental Impact Statement, Vegetation Treatments Using Herbicides on BLM Lands in 17 Western* States (BLM 2007b), and the *2008–2012 National Invasive Species Management Plan* (NISC 2008). The plan will cover periodic monitoring, reporting, and immediate eradication of noxious weed or invasive species occurring within all managed areas. A controlled inspection and cleaning area will be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces. To prevent the spread of invasive species, project developers will work with the local BLM field office to determine whether a pre-activity survey is warranted and, if so, to conduct the survey. If invasive plant species are present, project

developers will work with the local BLM field office to develop a control strategy. The plan will include a post-construction monitoring element that incorporates adaptive management protocols.

- Where revegetation and restoration are used as a tool to mitigate or rehabilitate project impacts following construction and/or decommissioning, the proponent will assist in ongoing BLM efforts to procure and develop locally and regionally appropriate native plant materials. Where conditions permit, the project developer will collect and voucher seeds from native plant species identified on BLM target lists for regional native plant material development by following the BLM Seeds of Success Protocol as described in BLM's Handbook H1740-2, *Integrated Vegetation Management* (BLM 2008a). On the basis of the expected need for native plant materials, the project developer will contribute funding to support the BLM Native Plant Materials Development Program. The suggested funding rate is $100 in U.S. dollars per acre for each acre on which restoration or revegetation will be used to mitigate project impacts and for each acre expected to be rehabilitated following site decommissioning.

- To reduce the risk of non-native and nuisance aquatic species introductions, equipment used in surface water will be decontaminated as appropriate, especially equipment used to convey water (i.e., pumps).

- Herbicide use will be limited to nonpersistent, immobile substances. Only herbicides with low toxicity to wildlife and nontarget native plant species will be used, as determined in consultation with the Service. The typical herbicide application rate rather than the maximum application rate will be used where this rate is effective. All herbicides will be applied in a manner consistent with their label requirements and in accordance with guidance provided in the Final PEIS on vegetation treatments using herbicides. No herbicides would be used near or in surface water, streams (including ephemeral, intermittent, or perennial), riparian areas, or wetlands. Setback distances would be determined through coordination with federal and state resource management agencies. Before herbicide treatments are begun, a qualified biologist will conduct surveys of bird nests and of listed species to identify the special measures or best management practices necessary to avoid and minimize impacts on migratory birds and listed species.

- An Ecological Resources Mitigation and Monitoring Plan will be developed to avoid, minimize, or mitigate adverse impacts on important ecological resources. The plan will include, but not necessarily be limited to, the following elements, where applicable:
  - Revegetation, soil stabilization, and erosion reduction measures that will be implemented to ensure that all temporary use areas are restored. The plan will require that restoration occurs as soon as possible after activities

are completed in order to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
  - Mitigation and monitoring of unavoidable impacts on waters of the United States, including wetlands.
  - Compensatory mitigation and monitoring to address any significant direct, indirect, and cumulative impacts on, and loss of habitat for, listed plant and animal species.
  - Measures to reduce and monitor impacts on listed species developed in consultation with the appropriate federal and state agencies (e.g., the BLM, the Service, and state resource management agencies).
  - Monitoring the potential for increase in predation of listed species (e.g., desert tortoise and Utah prairie dog [*Cynomys parvidens*]) from ravens (*Corvus corax*) and other species that are attracted to developed areas and use tall structures opportunistically to spot vulnerable prey. Raven and other predator monitoring also would be addressed in the Nuisance Animal and Pest Control Plan.
  - Clearing of project sites and translocation of listed species, including the steps to implement the translocation, as well as the follow-up monitoring of populations in the receptor locations, as determined in coordination with the appropriate federal and state agencies. The need for a Listed Species Clearance and Translocation Plan would be determined on a project-specific basis.

- A Water Resources Mitigation and Monitoring Plan will be developed for each project. Changes in surface water or groundwater quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) or flow that result in the alteration of terrestrial plant communities or communities in wetlands, springs, seeps, intermittent streams, perennial streams, and riparian areas (including the alteration of cover and community structure, species composition, and diversity) off the project site will be avoided to the extent practicable. A monitoring plan will be developed that determines the effects of groundwater withdrawals on plant communities.

- The BLM will require applicants to implement conservation measures to offset the effects of groundwater withdrawal on groundwater-dependent species and their habitats. Any withdrawal of groundwater will be conducted using an amount that offsets any loss of irrigation return flows due to the change in use (e.g., agricultural to industrial) and any probable increase in actual groundwater pumping due to less than full utilization of the rights converted for the project. Annual consumptive groundwater use within basins that support groundwater-dependent species (and those that provide significant underflow to those basins) will not increase over current levels as a result of future solar projects (e.g., due to a loss of irrigation return flows and/or the full utilization of groundwater rights that have not been historically

fully utilized). This may be accomplished through the purchase and relinquishment of existing groundwater rights.

- Future solar projects will not result in points of groundwater withdrawal being moved closer to locations supporting groundwater-dependent species and/or increased pumping in the regional carbonate aquifer in areas with a significant potential to affect habitat for those species (albeit the total consumptive groundwater use may remain the same).

- Ecological monitoring programs will provide for monitoring during all project phases, including periods prior to construction (to establish baseline conditions) and during construction, operations, and decommissioning.

- The monitoring program requirements, including adaptive strategies, will be established at the project level to ensure that potential adverse impacts are mitigated. Monitoring programs will consider the monitoring requirements for each ecological resource present at the project site, establish metrics against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures.

- A Spill Prevention and Emergency Response Plan will be developed that considers sensitive ecological resources. Spills of any toxic substances will be promptly addressed and cleaned up before they can enter aquatic or other sensitive habitats as a result of runoff or leaching.

- A Fire Management and Protection Plan will be developed to implement measures that minimize the potential for a human-caused fire to affect ecological resources and that respond to natural fire situations.

- A Trash Abatement Plan will be developed that focuses on containing trash and food in closed and secured containers and removing them periodically to reduce their attractiveness to opportunistic species, such as common ravens, coyotes, and feral dogs, that could serve as predators on native wildlife and listed animals.

- Prior to any ground-disturbing activity, seasonally appropriate walkthroughs will be conducted by a qualified biologist or team of biologists to ensure that important or sensitive species or habitats are not present in or near project areas. Attendees at the walkthrough will include appropriate federal agency representatives, state natural resource agencies, and construction contractors, as appropriate. Habitats or locations to be avoided (with appropriately sized buffers) will be clearly marked.

- If it is determined through coordination with the appropriate federal and state agencies (e.g., the BLM, the Service, and state resource management

agencies) that it is necessary to translocate plant and wildlife species from project areas, developers will ensure that qualified biologists conduct pre- and post-translocation surveys for target species (especially if the target species are listed species) and release individuals to protected off-site locations as approved by the federal and state agencies. The biologists will coordinate with appropriate agencies in the safe handling and transport of any listed species encountered.

- In accordance with adaptive management strategies, new BLM Instruction Memoranda addressing wildlife and plants issues will be incorporated as appropriate.

2.2.3 Design Features Related to Site Characterization

- Vehicles and site workers will avoid entering aquatic habitats, such as streams and springs, during site characterization activities until surveys by qualified biologists have evaluated the potential for unique flora and fauna to be present.

- Meteorological towers and solar sensors will be located to avoid sensitive habitats; applicable land use plans or best available information and science will be referred to in order to determine avoidance distances. Guy wires on meteorological towers will be avoided. If guy wires are necessary, permanent markers (bird flight diverters) will be attached to them to increase their visibility.

- Meteorological towers, soil borings, wells, and travel routes will be located to avoid important, sensitive, or unique habitats, including, but not limited to, wetlands, springs, seeps, ephemeral streams, intermittent streams, 100-year floodplains, ponds and other aquatic habitats, riparian habitat, remnant vegetation associations, rare natural communities, and habitats supporting listed species populations as identified in applicable land use plans or best available information and science.

2.2.4 Design Features Related to Construction

- Prior to construction of the facility, environmental training will be provided to contractor personnel whose activities or responsibilities could affect the environment during construction. An environmental compliance officer and other inspectors, the contractor's construction field supervisor(s), and all construction personnel are expected to play an important role in maintaining strict compliance with all permit conditions in order to protect wildlife and their habitats to the extent practicable during construction.

- Prior to construction, all areas to be disturbed will be surveyed by qualified biologists using approved survey techniques or established species-specific survey protocols to determine the presence of listed species in the project area.

- If possible, on-site construction access routes will be rolled and compacted to allow trucks and equipment to access construction locations. Following construction, disturbed areas will be lightly raked and/or ripped and reseeded with seeds from low-stature plant species collected from the immediate vicinity.

- To the extent practicable, vegetation clearing, grading, and other construction activities will occur outside the bird breeding season. If activities are planned for the breeding season, a survey of nesting birds will be conducted first. If active nests are not detected, construction activities will be conducted. If active nests are detected, the nest area will be flagged, and no activity will take place near the nest (at a distance coordinated with the Service) until nesting is completed (i.e., nestlings have fledged or the nest has failed) or until appropriate agencies agree that construction can proceed with the incorporation of agreed-upon monitoring measures. If active nests are not detected, appropriate agencies will be consulted to confirm that construction may proceed.

- Explosives will be used only within specified times and at specified distances from sensitive wildlife or surface waters, as established by the BLM or other federal and state agencies. The occurrence of flyrock from blasting will be limited by using blasting mats.

- The extent of habitat disturbance during construction will be reduced by keeping vehicles on access roads and minimizing foot and vehicle traffic through undisturbed areas.

- Temporary or project-created access roads will be closed to unauthorized vehicle use, where appropriate.

- Where a pipeline trench may drain a wetland, trench breakers will be constructed, and/or the trench bottom will be sealed to maintain the original wetland hydrology.

- Open trenches will be backfilled as quickly as possible. Open trenches could entrap small animals; therefore, escape ramps will be installed along open trench segments at distances identified in the applicable land use plan or best available information and science.

- An appropriate number of qualified biological monitors (as determined by the federal authorizing agency and the Service) will be on-site during initial site preparation and during the construction period to monitor, capture, and

relocate animals that could be harmed and are unable to leave the site on their own.

- When possible, any reptile or amphibian species found in harm's way will be relocated away from the activity.

- Construction debris, especially treated wood, will not be stored or disposed of in areas where it could come in contact with aquatic habitats.

- Project-specific Integrated Vegetation Management Plans will investigate the possibility of revegetating parts of the solar array area. Where revegetation is accomplished, fire breaks are required, such that the vegetated areas would not result in an increased fire hazard.

- Re-establishment of vegetation within temporarily disturbed areas will be done immediately following the completion of construction activities, provided such revegetation will not compromise the function of the buried utilities. Species salvaged during construction will be transplanted into these areas at a density similar to that of preconstruction conditions. Revegetation will focus on the establishment of native plant communities similar to those present in the vicinity of the project site. Species used will consist of native species dominant within the plant communities that exist in adjacent areas and have similar soil conditions. Certified weed-free seed mixes of native shrubs, grasses, and forbs of local origin will be used. In areas where suitable native species are unavailable, other plant species approved by the BLM will be used.

2.2.5 Design Features Related to Operations

- Areas left in a natural condition during construction (e.g., wildlife crossings) will be maintained in as natural a condition as possible within safety and operational constraints.

- To minimize habitat loss and fragmentation, as much habitat as possible will be re-established after construction is complete by maximizing the area reclaimed during solar energy operations.

- Lighting will be designed to provide the minimum illumination needed to achieve safety and security objectives. It will be shielded and orientated to focus illumination on the desired areas and to minimize or eliminate lighting of off-site areas or the sky. All unnecessary lighting will be turned off at night to limit attracting migratory birds or listed species.

- To minimize the potential for bird strikes, applicants will use audio visual warning system (AVWS) technology for any structures exceeding 200 ft

(60 m) in height. If the Federal Aviation Administration (FAA) denies a permit for use of AVWSs, applicants will coordinate with the Service and appropriate state natural resource agencies to identify lighting that meets the minimum FAA safety requirements and minimizes the possibility of bird strikes.

- Evaporation ponds will be fenced and netted to prevent use by wildlife where feasible. Open water sources in the desert provide subsidies to ravens and other predators that feed on listed species (e.g., desert tortoise and Utah prairie dog). In addition, these water sources may have elevated levels of harmful contaminants (e.g., total dissolved solids and selenium) and could attract wildlife into an industrialized area where they are more likely to be killed. The lower 18 in. (46 cm) of the fencing will be a solid barrier that would exclude entrance by amphibians and other small animals.

- To prevent the effects of the West Nile virus on wildlife, a mosquito abatement program will be implemented for all evaporation ponds or other standing bodies of water that have the potential to support mosquito reproduction.

- Pesticide and herbicide use would be conducted in accordance with a Nuisance Animal and Pest Control Plan and an Integrated Vegetation Management Plan.

2.2.6 Design Features Related to Decommissioning and Reclamation

- A Decommissioning and Site Reclamation Plan specific to the project will be developed, approved by the BLM, and implemented, and will include the following elements:
  - The plan will contain an adaptive management component that allows for the incorporation of lessons learned from monitoring data.
  - The plan will require that land surfaces be returned to predevelopment contours to the greatest extent feasible immediately following decommissioning.
  - The plan will be designed to expedite the re-establishment of vegetation and require restoration to be completed as soon as practicable.
  - To ensure rapid and successful re-establishment efforts, the plan will specify site-specific measurable success criteria, including target dates, which will be developed in coordination with the BLM and be required to be met by the operator.
  - Vegetation re-establishment efforts will continue until all success criteria have been met.
  - Bonding to cover the full cost of vegetation re-establishment will be required.

  - Species used for re-establishing vegetation will consist of native species that are dominant within the plant communities in adjacent areas that have similar soil conditions.
  - The plan will require the use of weed-free seed mixes of native shrubs, grasses, and forbs of local sources where available. When available, seeds of known origin, as labeled by state seed certification programs, will be used. Local native genotypes will be used where practicable. If cultivars of native species are used, certified seeds (i.e., blue tag) will be used. "Source identified" seeds (i.e., yellow tag) will be used when native seeds are collected from wildland sites.
  - The cover, species composition, and diversity of the re-established plant community will be similar to those of plant species present on-site prior to project development and in the vicinity of the site. Baseline data would be collected in each project area prior to its development as a benchmark for measuring the success of reclamation efforts. In areas where suitable native species are unavailable, other plant species approved by the BLM will be used. If non-native plants are necessary, they will be noninvasive, noncompetitive, and, ideally, short-lived and have low reproductive capabilities or be self-pollinating to prevent gene flow into the native community. The non-native plants that are used will not exchange genetic material with common native plant species.
  - The plan will be developed in coordination with appropriate federal and state agencies.

- Access roads will be reclaimed when they are no longer needed. However, seasonal restrictions (e.g., nest and brood rearing) will be considered (e.g., identified in the land use plan or substantiated by best available information or science).

- All holes and ruts created by the removal of structures and access roads will be filled or graded.

- While structures are being dismantled, care will be taken to avoid leaving debris on the ground in areas where wildlife regularly moves.

- Post-decommissioning protocols will include monitoring for the recovery of native vegetation, colonization and spread of invasive species, use by wildlife, and use by listed species. Monitoring data will be used to determine the success of reclamation activities and the need for changes in ongoing management or for additional reclamation measures. Ongoing visual inspections for a minimum of 5 years following decommissioning activities will be required to ensure that there is adequate restoration and minimal environmental degradation. This period will be extended until satisfactory results are obtained.

- The facility fence will remain in place for several years to help reclamation (e.g., the fence could preclude large mammals and vehicles from disturbing revegetation efforts). Shorter times for maintaining fencing would be appropriate in cases for which the likelihood of disturbance by cattle and wildlife is low. In some cases, it would be appropriate to replace the original exclusion fence with a new fence that excludes cattle and vehicles but allows for use by pronghorn and large-game wildlife. This secondary fencing will remain in place until the revegetation efforts meet success criteria.

2.2.7 Design Features Related to Transmission Lines and Access Roads

The following design features are specifically applicable to protecting ecological resources and listed species from transmission line construction, operation, and maintenance. These design features will be required as part of the BLM's Solar Energy Program in connection with transmission construction for any solar facilities on BLM-administered lands in the six-state study area.

- The placement of transmission towers within aquatic and wetland habitats will be avoided whenever feasible. If towers must be placed within these habitats, they will not impede flows or fish passage.

- If transmission lines are located near aquatic habitats or riparian areas (e.g., minimum buffers identified in the applicable land use plan or by best available science and information), vegetation maintenance will be limited and performed mechanically rather than with herbicides. Cutting in wetlands or stream and wetland buffers will be done by hand or by feller-bunchers. Tree cutting in stream buffers will target only trees able to grow into a transmission line conductor clearance zone within 3 to 4 years. Cutting in such areas for construction or vegetation management will be minimized, and the disturbance of soil and remaining vegetation will be minimized.

- Habitat disturbance will be minimized by using helicopters for construction to lessen the need for access roads, and by locating transmission facilities in previously disturbed areas. Existing utility corridors and other support structures will be used to the maximum extent feasible.

- The establishment and spread of invasive species and noxious weeds within the ROW and in associated areas where there is ground surface disturbance or vegetation cutting will be prevented. The area will be monitored regularly, and invasive species will be eradicated immediately.

- If needed, temporary access roads will be developed, primarily by the removal of woody vegetation, although temporary timber mats would be used in areas of wet soils. Wide-tracked or balloon-tired equipment, timber corduroy, or timber mat work areas will be used on wet soils where wetland or stream

crossings are unavoidable and where crossing on frozen ground is not possible in winter. Areas rutted by equipment will be immediately regraded and revegetated. Towers will be installed by airlift helicopters, where necessary, to avoid extensive crossing of wetlands or highly sensitive areas (such as those identified as rare natural habitats).

- ROW development and construction activities will adhere to locally established wildlife and/or habitat protection provisions. Exceptions or modifications to spatial buffers or timing limitations will be evaluated on a site-specific and species-specific basis in coordination with the local federal administrator and state wildlife agency.

- Restrictions on timing and duration will be required to minimize impacts on nesting birds (especially neotropical migrants and listed species) and will be developed in coordination with the USFWS.

- To the extent practicable, work personnel will stay within the ROW and/or easements.

- Removal of raptor nests will take place only if the birds are not actively using the nest, particularly during the nesting and brood-rearing period. Nests will be relocated to nesting platforms, when possible; otherwise, they must be destroyed when removed. An annual report on all nests moved or destroyed will be provided to the appropriate federal and/or state agencies. Coordination with the USFWS and BLM project wildlife biologist will occur in the event that a raptor nest is located on a transmission line support structure. Removal or relocation of a golden eagle or bald eagle nest (even an inactive nest) requires a permit from the USFWS.

- Raven nests will be removed from transmission towers to reduce predation pressure on listed species, such as the desert tortoise, greater sage-grouse, and Utah prairie dog. Raven nests can be removed only when inactive (i.e., no eggs or young); if removal is otherwise necessary, an MBTA take permit from the USFWS is required. The removal of raven nests would be addressed in the Nuisance Animal and Pest Control Plan.

- Current guidelines and methodologies would be used in the design and analysis of proposed transmission facilities in order to minimize the potential for raptors and other birds to be electrocuted by them or to collide with them.

- Transmission line support structures and other facility structures will be designed to discourage their use by raptors for perching or nesting (e.g., by use of anti-perching devices). This design would also reduce the potential for increased predation of listed species, such as the desert tortoise, sage-grouse, and Utah prairie dog. Mechanisms to visually warn birds (permanent markers

or bird flight diverters) will be placed on transmission lines at regular intervals to prevent birds from colliding with the lines.

- To the extent practicable, the use of guy wires will be avoided because they pose a collision hazard for birds and bats. Guy wires will be clearly marked with bird flight diverters to reduce the probability of collision.

- Shield wires will be marked with devices that have been scientifically tested and found to significantly reduce the potential for bird collisions.

- Any mortality of listed species associated with power lines will be monitored and reported to the BLM and the USFWS, and measures will be taken to prevent future mortality.

3 CONSULTATION PROTOCOL

This programmatic BA focuses on potential effects resulting from solar energy development within designated SEZs (285,000 acres [1,153 km^2]). Under the proposed action, the BLM will incorporate information in this BA and resulting BO in reviewing applications for a solar energy development ROW within an SEZ and in making decisions regarding ROW authorizations. Additional National Environmental Policy Act (NEPA) analyses and ESA consultation may still be required for federally listed and proposed species at the project level.

Design features for projects have been developed to avoid locations or certain technologies that may affect off-site aquatic, riparian, and groundwater-dependent species and their habitats. For these reasons, it was assumed that impacts on groundwater-dependent species will be minimized. However, an evaluation of water requirements for each development will be determined at the project level. If a future project is determined to have the potential to affect aquatic, semiaquatic, or groundwater-dependent species, additional NEPA evaluation and documentation and consultation with the Service will be required.

In fulfillment of BLM's responsibilities under Section 7(a)(2) of the ESA, this BA focuses on those species that could be affected by site characterization, construction, operations, and decommissioning of solar energy facilities that would be located on designated SEZs. Section 7(a)(2) states that each federal agency will, in consultation with the Secretary, ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. In fulfilling these requirements, each agency is to use the best scientific and commercial data available. This section of the ESA sets out the consultation process, which is further implemented by regulation detailed in 50 CFR Part 402.

The species that are evaluated in this BA are those that could have suitable habitat in the affected area of at least one of the SEZs. See Figures 2-1 through 2-6 for the locations of SEZs. The SEZ affected area includes both the direct and indirect effects areas. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur). The area of direct effects includes the SEZ footprint and the portion of assumed transmission lines and access road corridors where ground-disturbing activities would occur[2] (locations for access roads are unknown, so hypothetical likely locations were assumed; refer to Section 4 and Table 4-1 for SEZ-specific assumptions). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide assumed access road corridors where ground-disturbing activities

[2] The Draft Solar PEIS also included evaluation of assumed transmission corridors from some of the SEZs to the nearest existing transmission line. Based on comments and further agency evaluation that determined these analyses were speculative and insufficient, the assessment of specific assumed transmission corridors from SEZs was eliminated from the analysis for the Final PEIS. New SEZ transmission analyses that do not hypothesize specific tie-in locations for the SEZs will be included in the Final PEIS. In addition, project-specific analyses would be required to identify specific impacts of new transmission construction and line upgrades for any projects proposed within SEZs.

would not occur but that could be indirectly affected by activities in the area of direct effects. Indirect effects considered in the assessment include effects from surface runoff, dust, noise, lighting, and accidental spills from the SEZ. The potential magnitude of indirect effects would decrease with increasing distance away from the SEZ. The area of indirect effects was considered sufficiently large to substantially bound the area that would be subject to indirect effects, and is consistent with the results of studies that have documented indirect ecological impacts of energy development (e.g., Sawyer et al. 2006).

In addition to the direct and indirect effects areas of each SEZ, assumptions were made regarding the need for new access roads for each SEZ based on the SEZ's proximity to existing access roads. It was assumed that an existing major road (paved U.S., State, or Interstate highway) that intersected or was adjacent to (or within 1 mi [1.6 km] of) the SEZ could provide initial road access to the SEZ (and thus no additional acreage disturbance for access roads was assumed). If an existing major road was not within or adjacent to an SEZ, it was assumed that, at a minimum, an access road would be constructed from the SEZ boundary to the nearest major road to connect the SEZ to the regional transportation system. The assumed access road was a straight-line path between the SEZ and the nearest existing major road. This assumption was made without additional information on the need for upgrade of existing roadways or logistical constraints (i.e., topography).

Any projects that deviated from these assumptions regarding the direct and indirect effects areas of the SEZs and the location of new access roads would require additional consultation from that provided in this programmatic BA.

This BA considers whether or not solar energy development on SEZs is likely to jeopardize the continued existence of any species listed under the ESA. As identified in the design features described in Section 2.2, there are a number of measures that are required of project proponents, as well as requirements to conduct pre-disturbance surveys in consultation with the Service. This BA does not preclude the need to engage in project-specific ESA consultation that could tier from this programmatic BA.

Groundwater-dependent species would require consideration in project-specific consultations. Sufficient site-specific or technology-specific information is not available to programmatically evaluate impacts of solar energy development on groundwater resources and groundwater-dependent species that are not located on the SEZ. Design features for projects in the proposed Solar Energy Program have been developed to avoid locations or certain technologies that may affect groundwater-dependent species. For these reasons, it was assumed that impacts on groundwater-dependent species will be minimized. However, an evaluation of groundwater requirements for each development will be determined at the project level. If a future project is determined to have the potential to affect groundwater-dependent species, additional NEPA evaluation and documentation and consultation with the Service will be required.

4 DESCRIPTION OF THE ACTION AREA

As described in the Draft PEIS and the Supplement, under its proposed Solar Energy Program, the BLM had originally identified 24 proposed SEZs in the six southwestern states of Arizona, California, Colorado, Nevada, New Mexico, and Utah. Based on public comments on the Draft PEIS and further agency evaluation, the BLM decided to eliminate seven SEZs from further consideration. The proposed action now includes 17 SEZs within the 6-state region. The total area encompassed by these 17 SEZs is approximately 285,000 acres (1,153 km^2). There is at least one SEZ in each of the six states (Table 4-1). Together, these SEZs and their affected areas encompass the action area considered in this BA. The locations of the SEZs in each state are shown in Figures 2-1 through 2-6 and are discussed below. Legal descriptions for each of the 17 SEZs are provided in Appendix A.

The SEZ affected areas include the areas of direct and indirect effects from development on the SEZ and from assumed new access roads as described in Section 3. Species that could occur within the SEZ affected areas were determined from natural heritage records available through Nature Serve Explorer (NatureServe 2010) and information provided by the State Natural Resource Agencies, Natural Heritage Programs, state-level Gap Analysis Programs (e.g., California Regional Gap Analysis Project [USGS 2010]), Southwest Regional Gap Analysis Project (SWReGAP) (USGS 2004, 2005, 2007), and USFWS Environmental Conservation Online System (ECOS) (USFWS 2010a). Information reviewed consisted of county-level occurrences as determined from NatureServe, species occurrence records provided by the State Natural Resource and Natural Heritage Programs, and modeled land cover types and predicted suitable habitats for the species within the 50-mi (80-km) region as determined from GAP models.

The geographic setting and development assumptions of each SEZ are provided below (in alphabetical order by state). Table 4-1 lists characteristics of the assumed development areas at each SEZ.

4.1 ARIZONA SEZS

4.1.1 Brenda

The proposed Brenda SEZ is located in La Paz County in west-central Arizona (Figure 4-1), 32 mi (52 km) east of the California border. The SEZ has a total developable area of 3,847 acres (16 km^2). In 2008, the county population was 20,005, while adjacent Riverside County to the west in California had a population of 2,087,917. The towns of Quartzsite and Salome in La Paz County are about 18 mi (29 km) west of and 18 mi (29 km) east of the SEZ respectively. The Phoenix metropolitan area is approximately 100 mi (161 km) to the east of the SEZ, and Los Angeles is approximately 230 mi (370 km) to the west.

TABLE 4-1 Assumed Development Areas for Each SEZ

State	SEZ	SEZ Developable Area (acres)	Length of Assumed Access Road (mi)	Access Road Construction Area (acres)	Indirect Effects Area (acres)	Affected Area (acres)[a]
Arizona	Brenda	3,847	–[b]	–	90,664	94,511
	Gillespie	2,618	3	22	99,221	101,861
California	Imperial East	5,717	–	–	108,370	114,087
	Riverside East	147,910	–	–	566,269	714,179
Colorado	Antonito Southeast	9,712	–	–	113,733	123,445
	De Tilla Gulch	1,064	–	–	70,806	71,870
	Fourmile East	2,882	–	–	88,656	91,538
	Los Mogotes East	2,650	3	22	88,516	91,188
Nevada	Amargosa Valley	8,479	–	–	108,556	117,035
	Dry Lake	5,717	–	–	93,115	98,832
	Dry Lake Valley North	25,069	8	58	157,451	182,578
	Gold Point	4,596	–	–	87,957	92,553
	Millers	16,534	–	–	126,349	142,883
New Mexico	Afton	29,964	–	–	177,171	207,135
Utah	Escalante Valley	6,533	15	109	119,026	125,668
	Milford Flats South	6,252	5	36	107,424	113,712
	Wah Wah Valley	5,873	–	–	95,705	101,578

[a] Affected area is the sum of the SEZ size, access road construction area, and indirect effects area.

[b] A dash indicates the development area is not applicable to the SEZ.

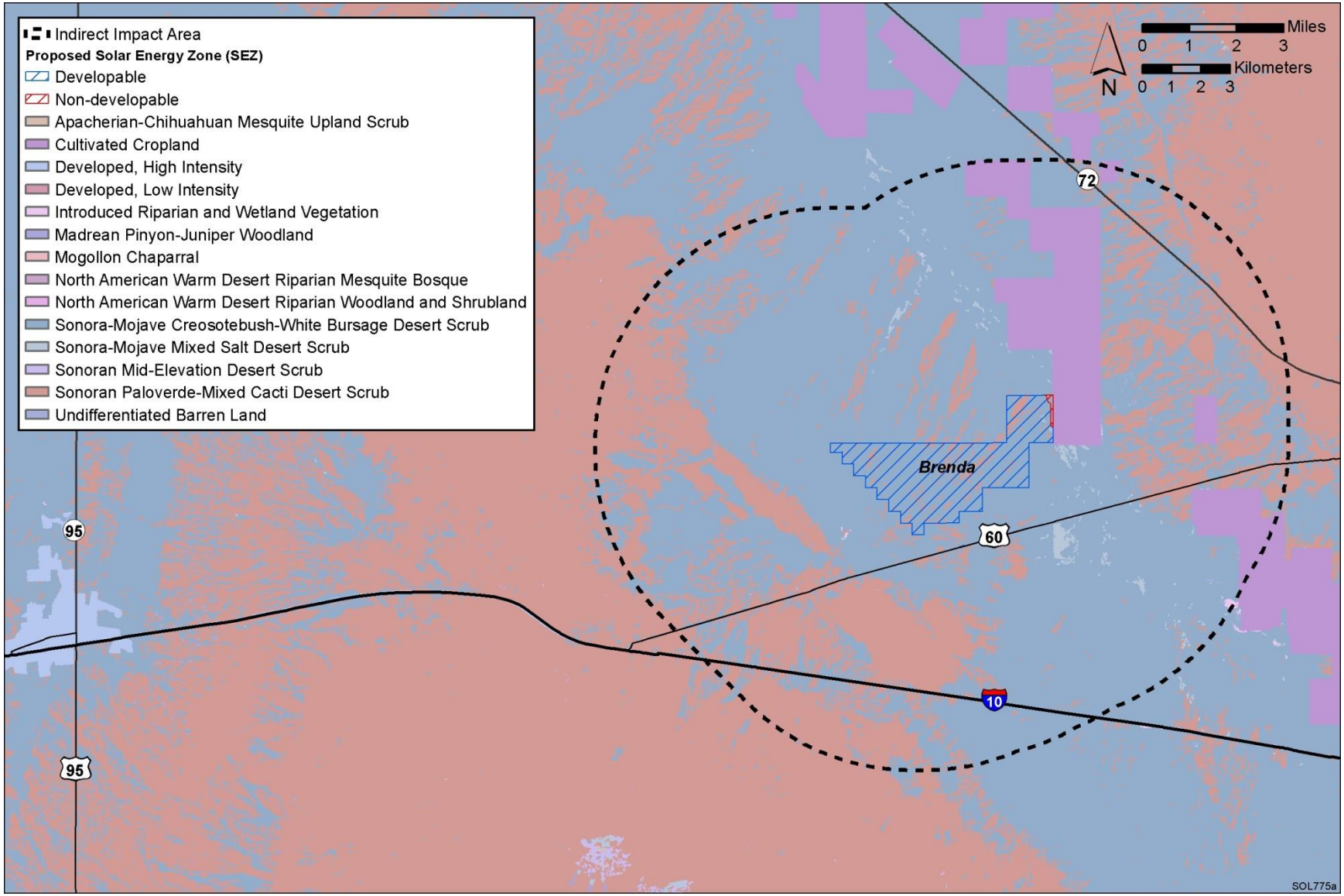

FIGURE 4-1 Proposed Brenda SEZ and Associated Land Cover Types

The nearest major road access to the SEZ is via U.S. 60, which runs southwest to northeast along the southeast border of the Brenda SEZ. It was assumed that no new access road development would be needed to serve the Brenda SEZ (Figure 4-1; Table 4-1).

The proposed Brenda SEZ is located within the Sonoran Basin and Range Level III ecoregion (EPA 2007), which supports creosotebush (*Larrea tridentata*)-white bursage (*Ambrosia dumosa*) plant communities with large areas of palo verde (*Parkinsonia microphylla*)-cactus shrub and saguaro cactus (*Carnegiea gigantea*) communities (EPA 2002). The dominant species of the Lower Colorado River Valley subdivision of the Sonoran Desert are primarily creosotebush, white bursage, and all-scale (*Atriplex polycarpa*), with big galleta (*Pleuraphis rigida*), Palmer alkali heath (*Frankenia palmeri*), brittlebush (*Encelia farinosa*), and western honey mesquite (*Prosopis glandulosa* var. *torreyana*) dominant in some areas (Turner and Brown 1994). Larger drainageways and washes support species of small trees and shrubs that may also occur in adjacent areas, such as western honey mesquite, ironwood (*Olneya tesota*), and blue palo verde (*Parkinsonia florida*), as well as species such as smoketree (*Psorothamnus spinosa*) that are mostly restricted to drainageways. Shrub species found in minor drainages include cat-claw acacia (*Acacia greggii*), burrobrush (*Hymenoclea salsola* var. *pentalepis*), Anderson thornbush (*Lycium andersonii*), and desert broom (*Baccharis sarothroides*). Annual precipitation in the Sonoran Desert occurs in winter and summer (Turner and Brown 1994) and is very low in the area of the SEZ, averaging about 5.6 in. (14 cm).

4.1.2 Gillespie

The proposed Gillespie SEZ is located in Maricopa County in west–central Arizona (Figure 4-2). The SEZ has a total developable area of 2,618 acres (11 km^2). In 2008, the county population was 3,958,263. The nearest town is Arlington, about 7 mi (11 km) northeast of the SEZ, with a population of less than 500, while the larger town of Buckeye is located about 17 mi (27 km) northeast and has a population of more than 50,000. Phoenix, Arizona, is approximately 50 mi (48 km) northeast of the SEZ.

The nearest major road access to the SEZ is via Old U.S. 80, which runs north–south 3 mi (5 km) from the eastern tip of the Gillespie SEZ. It was assumed that a new access road would be needed to provide access from the SEZ to Old U.S. 80 (Figure 4-2; Table 4-1).

The proposed Gillespie SEZ is located within the Sonoran Basin and Range Level III ecoregion (EPA 2007), which supports creosotebush (*Larrea tridentate*)-white bursage (*Ambrosia dumosa*) plant communities with large areas of palo verde (*Parkinsonia microphyla*)-cactus shrub and saguaro cactus (*Carnegiea gigantea*) communities (EPA 2002). The dominant species of the Lower Colorado River Valley subdivision of the Sonoran Desert are primarily creosotebush, white bursage, and all-scale (*Atriplex polycarpa*), with big galleta (*Pleuraphis rigida*), Palmer alkali heath (*Frankenia palmeri*), brittlebush (*Encelia farinosa*), and western honey mesquite (*Prosopis glandulosa* var. *torreyana*) dominant in some areas (Turner and Brown 1994). Larger drainageways and washes support species of small trees and shrubs that may also occur in adjacent areas. Such species include western honey mesquite, ironwood (*Olneya tesota*), and blue palo verde (*Parkinsonia florida*), as well as species such as smoketree

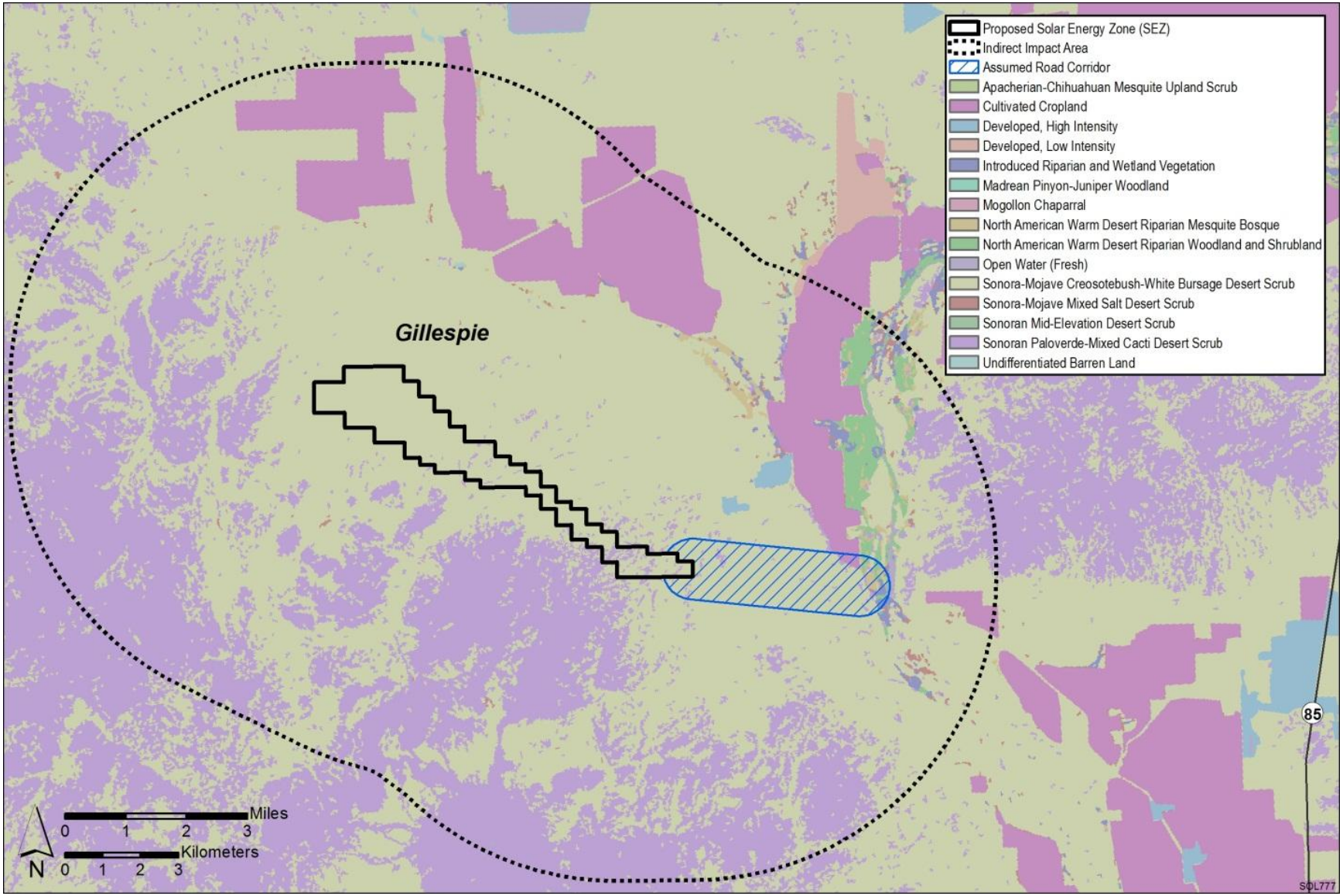

FIGURE 4-2 Proposed Gillespie SEZ and Associated Land Cover Types

(*Psorothamnus spinosus*), which are mostly restricted to drainageways. Shrub species found in minor drainages include cat-claw acacia (*Acacia greggii*), burrobrush (*Hymenoclea salsola* var. *pentalepis*), Anderson thornbush (*Lycium andersonii*), and desert broom (*Baccharis sarothroides*). The proposed Gillespie SEZ is located in an area transitional to the Arizona Upland subdivision, which includes palo verde-cacti-mixed scrub communities. Annual precipitation in the Sonoran Desert occurs primarily in winter and summer (Turner and Brown 1994) and is low in the area of the SEZ, averaging about 7.6 in. (19.3 cm).

4.2 CALIFORNIA SEZS

4.2.1 Imperial East

The proposed Imperial East SEZ has a total developable area of 5,717 acres (23 km^2) and is located in Imperial County in southeastern California, near the United States–Mexico border (Figure 4-3). In 2008, the Imperial County population was 180,493, while the two-county region—Imperial County and Yuma County, Arizona—surrounding the SEZ had a total population of 387,798. Calexico (population of 38,344) is located about 15 mi (24 km) to the west along State Route 98, and El Centro (population of 40,083) lies 19 mi (31 km) to the west along Interstate 8 in Imperial County.

Interstate 8 runs east–west along the northeast edge of the proposed SEZ, while State Route 98, a two-lane highway, passes through the southern edge. San Diego lies 120 mi (194 km) to the west, and the city of Yuma, 29 mi (47 km) to the east via Interstate 8. It was assumed that no new access road development would be needed to serve the Imperial East SEZ(Figure 4-3; Table 4-1).

The proposed Imperial East SEZ is located within the Sonoran Basin and Range Level III ecoregion (EPA 2007), which supports creosotebush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) plant communities with large areas of palo verde (*Cercidium microphyllum*)-cactus shrub and saguaro cactus (*Carnegiea gigantea*) communities (EPA 2002). The dominant species of the Lower Colorado River Valley subdivision of the Sonoran Desert are primarily creosotebush, white bursage, and all-scale (*Atriplex polycarpa*), with big galleta (*Pleuraphis rigida*), Palmer alkali heath (*Frankenia palmeri*), brittlebush (*Encelia farinosa*), and western honey mesquite (*Prosopis glandulosa* var. *torreyana*) dominant in some areas (Turner and Brown 1994). Larger drainageways and washes support species of small trees and shrubs that may also occur in adjacent areas, such as western honey mesquite, ironwood (*Olneya tesota*), and blue palo verde (*Cercidium floridum*), as well as species such as smoketree (*Psorothamnus spinosa*), which are mostly restricted to drainageways. Shrub species found in minor drainages include cat-claw acacia (*Acacia greggii*), burrobrush (*Hymenoclea salsola* var. *pentalepis*), Anderson thornbush (*Lycium andersonii*), and desert broom (*Baccharis sarothroides*). Annual precipitation in the Sonoran Desert occurs in winter and summer (Turner and Brown 1994) and is very low in the area of the SEZ, averaging about 2.7 in. (0.7 cm).

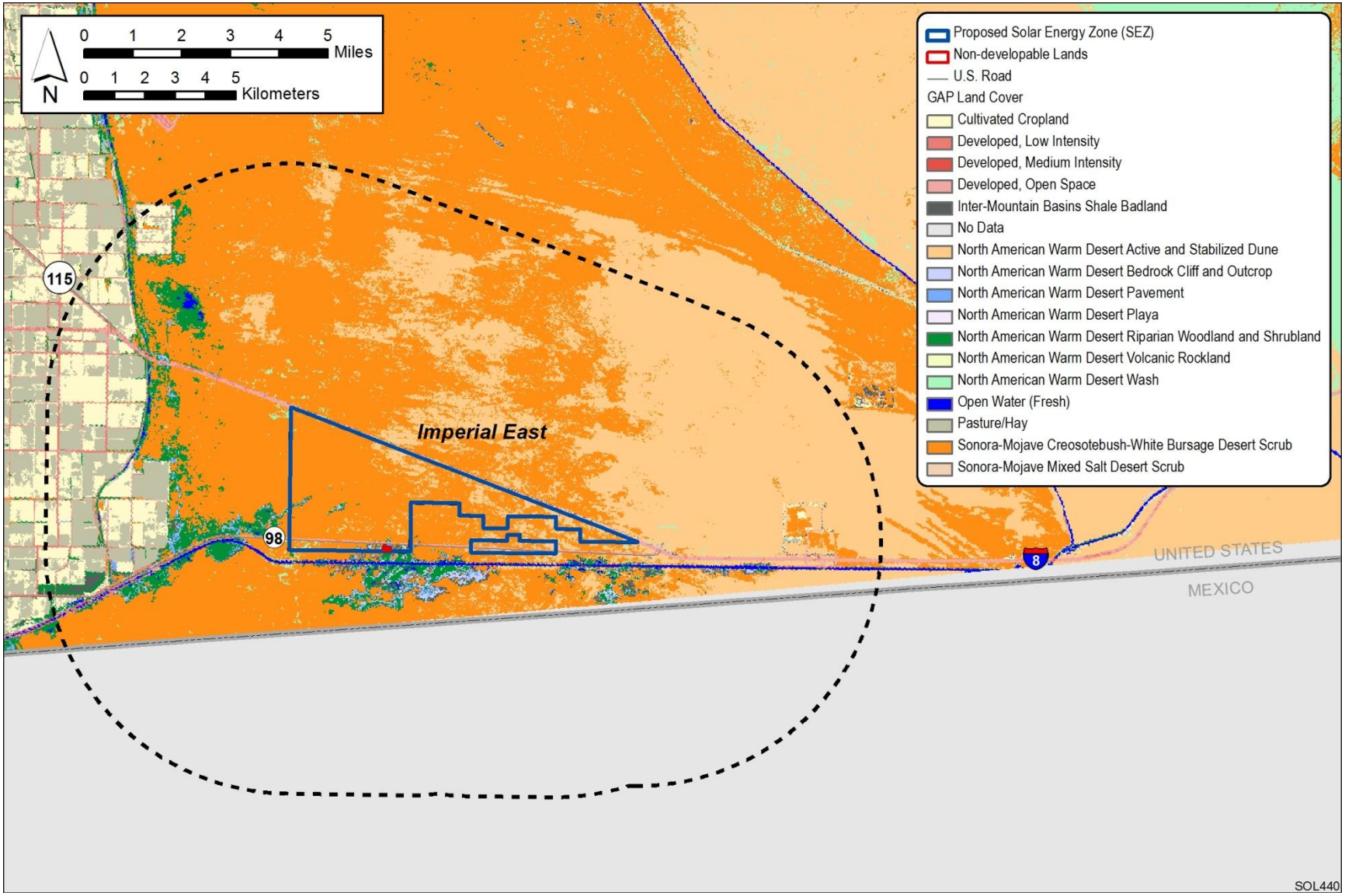

FIGURE 4-3 Proposed Imperial East SEZ and Associated Land Cover Types

4.2.2 Riverside East

The proposed Riverside East SEZ is the largest of the proposed SEZs in the six-state action area**,** with a total developable area of 147,910 acres (599 km^2). The SEZ spans a distance of about 45 mi (72 km) between the points farthest west and east, but it has an irregular shape with a large excluded central area (see Figure 4-4). The eastern boundary of the site is about 6 mi (10 km) west of the Arizona border. The western boundary is about 2 mi (3 km) from Joshua Tree National Park (NP) at its nearest point. The nearest towns with populations greater than 10,000 are Blythe, located about 6 mi (10 km) southeast of the SEZ with a 2008 population of 21,727, and Indio, located about 45 mi (72 km) west of the SEZ on Interstate 10, with a 2008 population of 84,443. The small town of Desert Center (2000 population of 150) is located at the far southwestern edge of the SEZ, along Interstate 10.

The SEZ is located in Riverside County in southeastern California. In 2008, the county population was 84,443. The closest large cities are Moreno Valley, San Bernardino, and Riverside (all located slightly more than 100 mi [161 km] west of the SEZ on Interstate 10). The interstate runs east–west along the southern boundary of the SEZ. Other paved roads that cross parts of the Riverside East SEZ include State Route 177, which runs north–south through the western section of the SEZ, and Midland Road, which crosses the northeastern portion of the SEZ. U.S. 95 runs north–south about 3 mi (5 km) from the eastern boundary of the SEZ and through the town of Blythe. It was assumed that no new access road development would be needed to serve the Riverside East SEZ (Figure 4-4; Table 4-1).

The proposed Riverside East SEZ is located in a transitional area that includes many species associated with the Mojave and Sonoran Deserts. Most of the SEZ is located within the Sonoran Basin and Range Level III ecoregion (EPA 2007), which supports creosotebush (*Larrea tridentata)*-white bursage (*Ambrosia dumosa*) plant communities with large areas of palo verde (*Cercidium microphyllum*)-cactus shrub and saguaro cactus (*Carnegiea gigantea*) communities (EPA 2002). The dominant species of the Lower Colorado River Valley subdivision of the Sonoran Desert are primarily creosotebush, white bursage, and all-scale (*Atriplex polycarpa*), with big galleta (*Pleuraphis rigida*), Palmer alkali heath (*Frankenia palmeri*), brittlebush (*Encelia farinosa*), and western honey mesquite (*Prosopis glandulosa* var. *torreyana*) dominant in some areas (Turner and Brown 1994). Larger drainageways and washes support species of small trees and shrubs that may also occur in adjacent areas, such as western honey mesquite, ironwood (*Olneya tesota*), and blue palo verde (*Cercidium floridum*), as well as species such as smoketree (*Psorothamnus spinosa*), which are mostly restricted to drainageways. Shrub species found in minor drainages include cat-claw acacia (*Acacia greggii*), burrobrush (*Hymenoclea salsola* var. *pentalepis*), Anderson thornbush (*Lycium andersonii*), and desert broom (*Baccharis sarothroides*). Annual precipitation in the Sonoran Desert occurs in winter and summer (Turner and Brown 1994) and is very low in the area of the SEZ, averaging about 3.5 in. (9.0 cm).

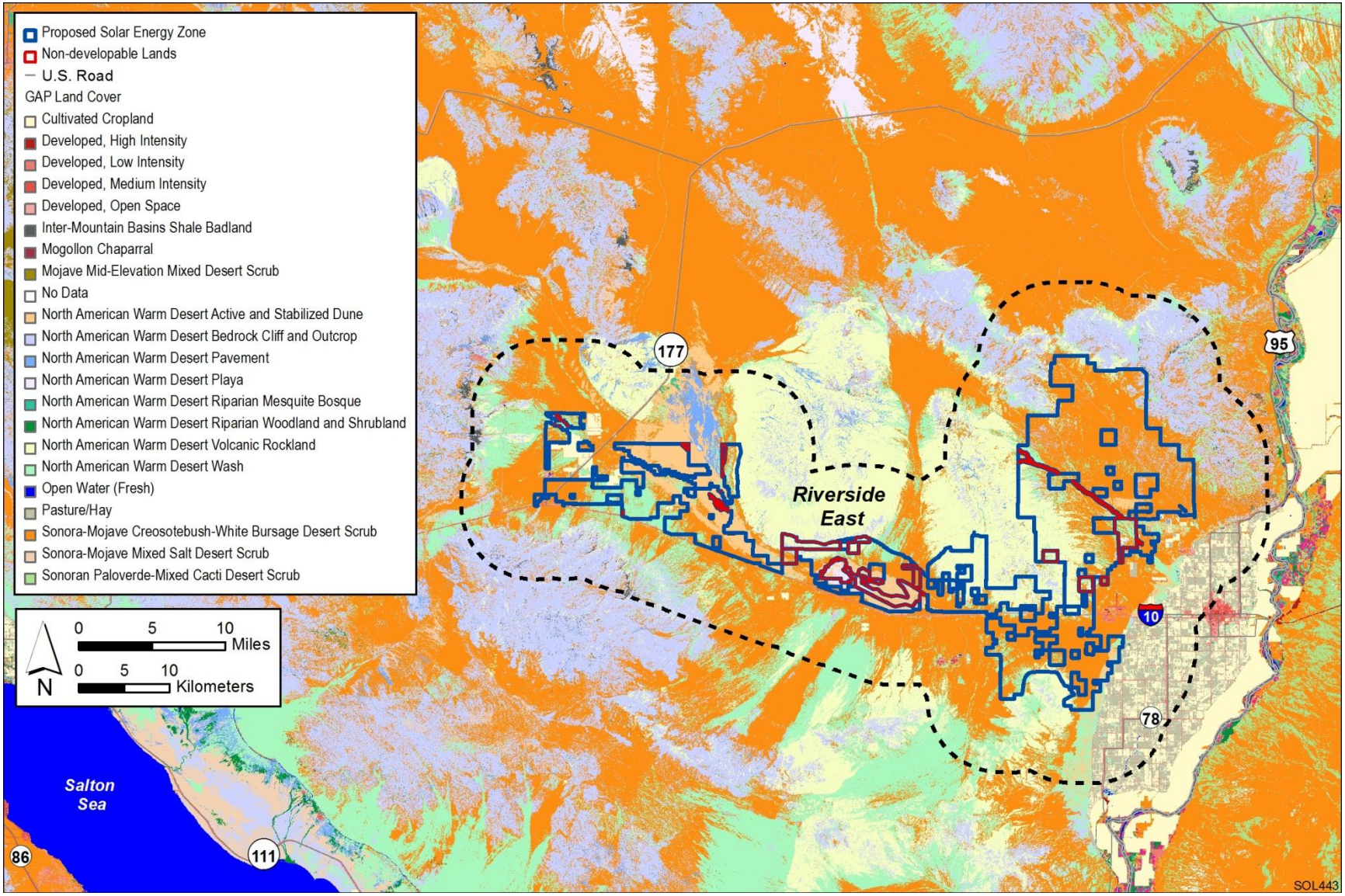

FIGURE 4-4 Proposed Riverside East SEZ and Associated Land Cover Types

4.3 COLORADO SEZS

4.3.1 Antonito Southeast

The proposed Antonito Southeast SEZ has a total developable area of 9,712 acres (39 km^2). The SEZ is located in southeastern Conejos County, on the southern Colorado state boundary with New Mexico (Figure 4-5). In 2008, the county population was 8,232, while the surrounding six-county region in Colorado and New Mexico had a population of 116,511. The largest nearby town of Alamosa (Alamosa County, Colorado), which had a 2008 population of 8,745, is about 34 mi (55 km) to the north. Several small towns lie closer to the SEZ, with Antonito, Colorado, a short distance to the northwest on U.S. 285.

The nearest major road is U.S. 285, which runs north–south along the western boundary of the SEZ. It was assumed that no new access road development would be needed to serve the Antonito Southeast SEZ (Figure 4-5; Table 4-1).

The proposed Antonito Southeast SEZ is located in the south-central part of the San Luis Valley, a high-elevation (approximately 8,000 ft [2,440 m]) basin between two large mountain ranges. The SEZ is located primarily within the San Luis Shrublands and Hills Level IV ecoregion, which supports shrublands, grasslands, and, on upper elevations of the San Luis Hills, pinyon-juniper woodlands (Chapman et al. 2006). The dominant species of the shrubland communities in this ecoregion are big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Ericameria nauseosa*), and winterfat (*Krascheninnikovia lanata*). Grassland species include western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle-and-thread (*Hesperostipa comata*). Small areas of the northern portions of the SEZ are within the San Luis Alluvial Flats and Wetlands Level IV ecoregion. Although most areas within this ecoregion have been converted to irrigated cropland, remaining shrubland communities include shadscale (*Atriplex confertifolia*), fourwing saltbush (*Atriplex canescens*), and greasewood (*Sarcobatus vermiculatus*). Annual precipitation in the vicinity of the SEZ is very low, averaging 7.3 in. (18.5 cm).

4.3.2 De Tilla Gulch

The proposed De Tilla Gulch SEZ has a total developable area of 1,064 acres (4 km^2) and is located in Saguache County in south-central Colorado (Figure 4-6). In 2008, the county population was 6,903, while the four-county region surrounding the SEZ—Alamosa, Chafee, Saguache, and Rio Grande Counties—had a total population of 51,974. The largest nearby town, which is located about 50 mi (80 km) to the south, is Alamosa with a 2008 population of 8,745. The village of Saguache is located about 8 mi (12 km) west of the SEZ on U.S. 285, which runs along the northwest side of the SEZ. It was assumed that no new access road development would be needed to serve the De Tilla Gulch SEZ (Figure 4-6; Table 4-1).

The proposed De Tilla Gulch SEZ lies in the northwestern portion of the San Luis Valley, part of the San Luis Basin, a large, high-elevation basin within the Rocky Mountains. The

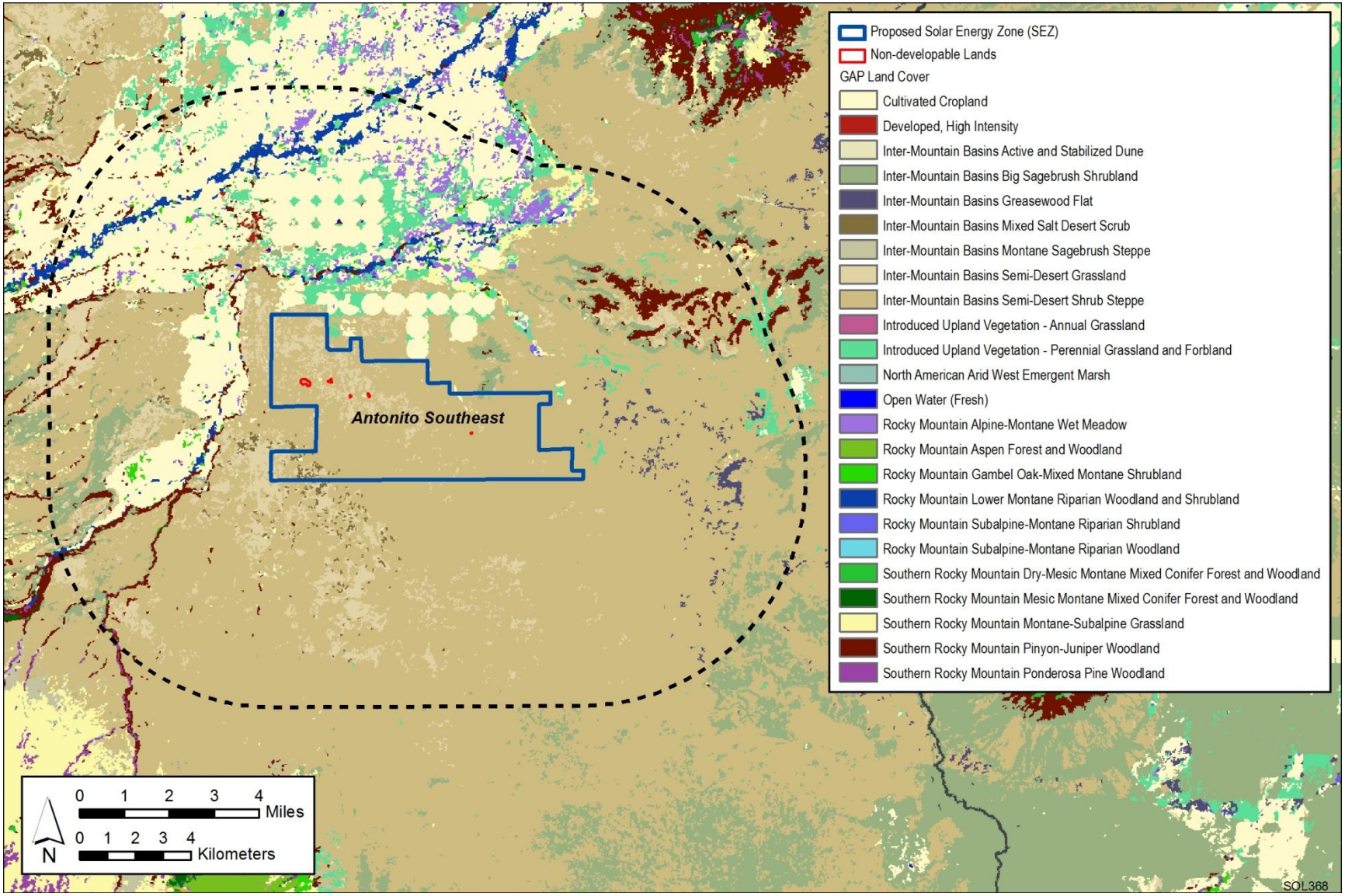

FIGURE 4-5 Proposed Antonito Southeast SEZ and Associated Land Cover Types

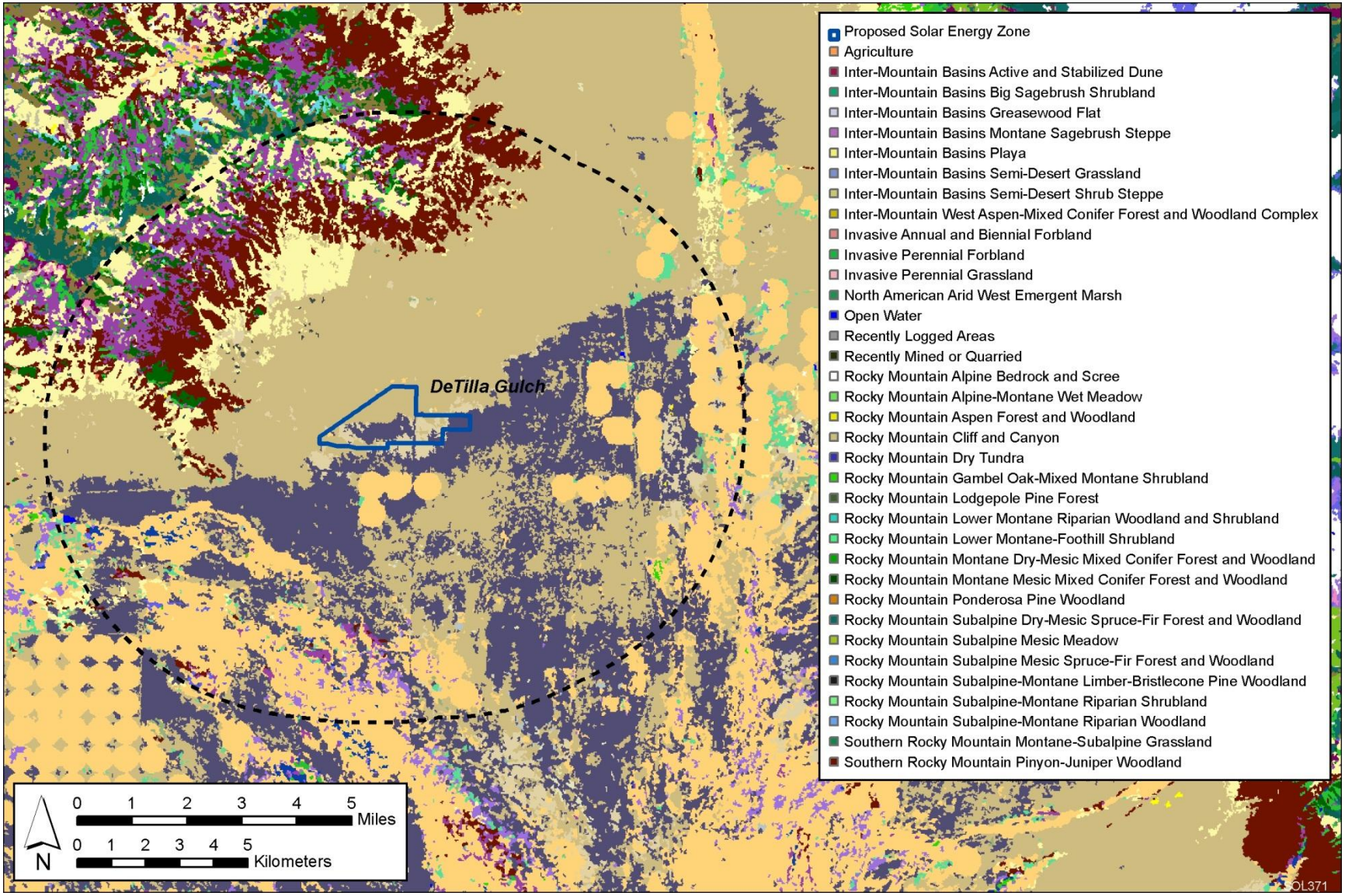

FIGURE 4-6 Proposed De Tilla Gulch SEZ and Associated Land Cover Types

San Juan Mountains to the west and the Sangre de Cristo Range to the east form the rim of the basin. The land within the proposed SEZ is flat and intersected with dry streambeds that run to the southeast. No development exists on the SEZ, nor is there any standing surface water.

The proposed De Tilla Gulch SEZ is located within the San Luis Shrublands and Hills Level IV ecoregion, which supports shrublands, grasslands, and, on upper elevations of the San Luis Hills, pinyon-juniper woodlands (Chapman et al. 2006). The dominant species of the shrubland communities in this ecoregion are big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Ericameria nauseosa*), and winterfat (*Krascheninnikovia lanata*). Grassland species include western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle-and-thread (*Hesperostipa comata*). This ecoregion is located within the Arizona/New Mexico Plateau Level III ecoregion. Annual precipitation in the vicinity of the SEZ is low, averaging 8.3 in. (21.0 cm).

4.3.3 Fourmile East

The proposed Fourmile East SEZ has a total developable area of 2,882 acres (12 km^2) and is located in Alamosa County in south-central Colorado (Figure 4-7). In 2008, the county population was 15,783, while the four-county region surrounding the SEZ—Alamosa, Conejos, Costilla, and Rio Grande Counties—had a total population of 39,759. The largest nearby town is Alamosa, with an estimated 2008 population of 8,745, which is located about 13 mi (21 km) to the west on U.S. 160.

The nearest major road, CO 150, runs north–south along the eastern boundary of the SEZ. U.S. 160 lies about 0.6 mi (1 km) south of the SEZ. Great Sands Dunes NP is located about 9 mi (14 km) north of the SEZ on CO 150. It was assumed that no new access road development would be needed to serve the Fourmile East SEZ (Figure 4-7; Table 4-1).

The proposed Fourmile East SEZ lies in the eastern San Luis Valley, part of the San Luis Basin, a high-elevation (approximately 8,000 ft [2,440 m]) basin between two large mountain ranges. The San Juan Mountains to the west and the Sangre de Cristo Range to the east form the rim of the basin. The SEZ is located within the Salt Flats Level IV ecoregion, which supports sparse shrubland plant communities (Chapman et al. 2006). The dominant species in this ecoregion are greasewood (*Sarcobatus vermiculatus*), fourwing saltbush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*), horsebrush (*Tetradymia* sp.), spiny hopsage (*Grayia spinosa*), rubber rabbitbrush (*Ericameria nauseosa*), saltgrass (*Distichlis spicata*), and alkali sacaton (*Sporobolus airoides*). This ecoregion is located within the Arizona/New Mexico Plateau Level III ecoregion.

Level IV ecoregions within 5 mi (8 km) of the SEZ include the Sand Dunes and Sand Sheets ecoregion, northwest of the SEZ, which supports scrub communities on sand sheets and sparse vegetation on sand dunes, which are mostly barren. To the northeast, with increasing elevation, lie the Foothill Shrublands ecoregion, which supports shrubland and woodland habitats with interspersed grasslands; the Crystalline Subalpine Forests ecoregion, which supports mostly coniferous forest along with aspen groves and subalpine meadows; and the

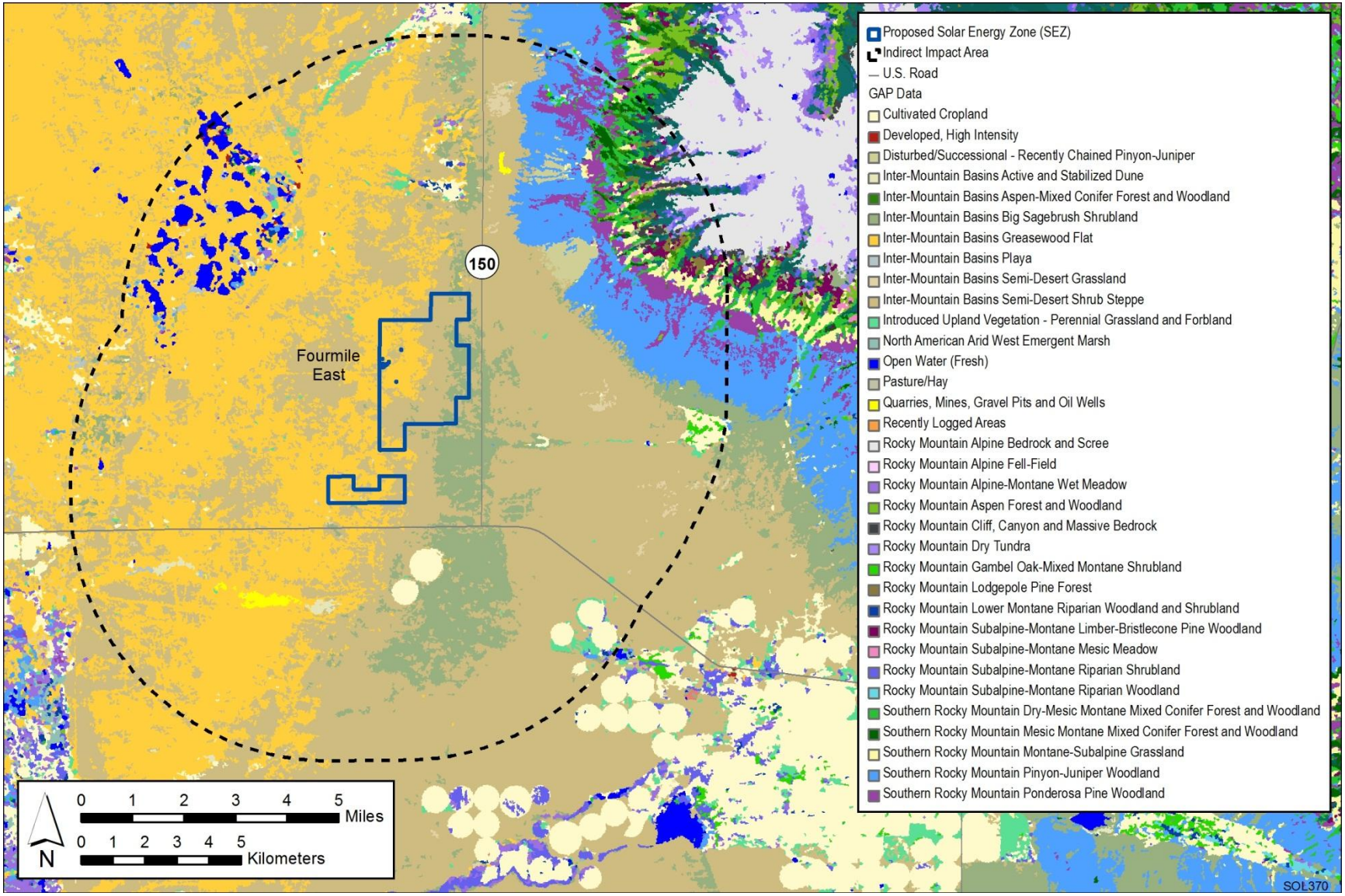

FIGURE 4-7 Proposed Fourmile East SEZ and Associated Land Cover Types

Alpine Zone ecoregion, which supports alpine meadows with sparse stunted trees near the tree line. To the southeast lies the San Luis Alluvial Flats and Wetlands ecoregion, which is mostly irrigated cropland and some remaining shrubland communities. Annual precipitation in the vicinity of the SEZ is low, averaging 7.1 in. (18.1 cm).

4.3.4 Los Mogotes East

The proposed Los Mogotes East SEZ has a total developable area of 2,650 acres (11 km^2). The SEZ is located in Conejos County in south-central Colorado, about 12 mi (19 km) north of the New Mexico border (Figure 4-8). In 2008, the county population was 8,745, while the four-county region surrounding the SEZ—Alamosa, Conejos, Costilla, and Rio Grande Counties—had a total population of 39,759. The largest nearby town is Alamosa, which had a 2008 population of 8,745, located about 22 mi (35 km) to the northeast on U.S. 285. This highway is located about 3 mi (5 km) east of the SEZ. It was assumed that a new access road would be needed to connect the SEZ to U.S. 285 (Figure 4-8; Table 4-1).

The proposed Los Mogotes East SEZ is located in the southwestern San Luis Valley, part of the San Luis Basin, a large, high-elevation basin within the Rocky Mountains. The San Juan Mountains to the west and the Sangre de Cristo Range to the east form the rim of the basin. There is no development on the SEZ, which is currently used for grazing. The SEZ is located primarily within the San Luis Alluvial Flats and Wetlands Level IV ecoregion. Although most areas within this ecoregion have been converted to irrigated cropland, remaining shrubland communities include shadscale (*Atriplex confertifolia*), fourwing saltbush (*Atriplex canescens*), and greasewood (*Sarcobatus vermiculatus*) (Chapman et al. 2006). The northwestern portion of this SEZ is located within the San Luis Shrublands and Hills Level IV ecoregion, which supports shrublands, grasslands, and, on upper elevations of the San Luis Hills, pinyon-juniper woodlands. The dominant species of the shrubland communities in this ecoregion are big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Ericameria nauseosa*), and winterfat (*Krascheninnikovia lanata*). Grassland species include western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle-and-thread (*Hesperostipa comata*). Land areas surrounding the SEZ lie within the San Luis Alluvial Flats and Wetlands and the San Luis Shrublands and Hills Level IV ecoregions. Annual precipitation in the vicinity of the SEZ is low, averaging 7.3 in. (18.5 cm).

4.4 NEVADA SEZS

4.4.1 Amargosa Valley

The proposed Amargosa Valley SEZ is located in Nye County in southern Nevada near the California border (Figure 4-9). The SEZ has a total developable area of 8,479 acres (34 km^2). In 2008, the county population was 44,175, while adjacent Clark County to the southeast had a population of 1,879,093. The closest towns to the SEZ are Beatty, about 11 mi (18 km) north on

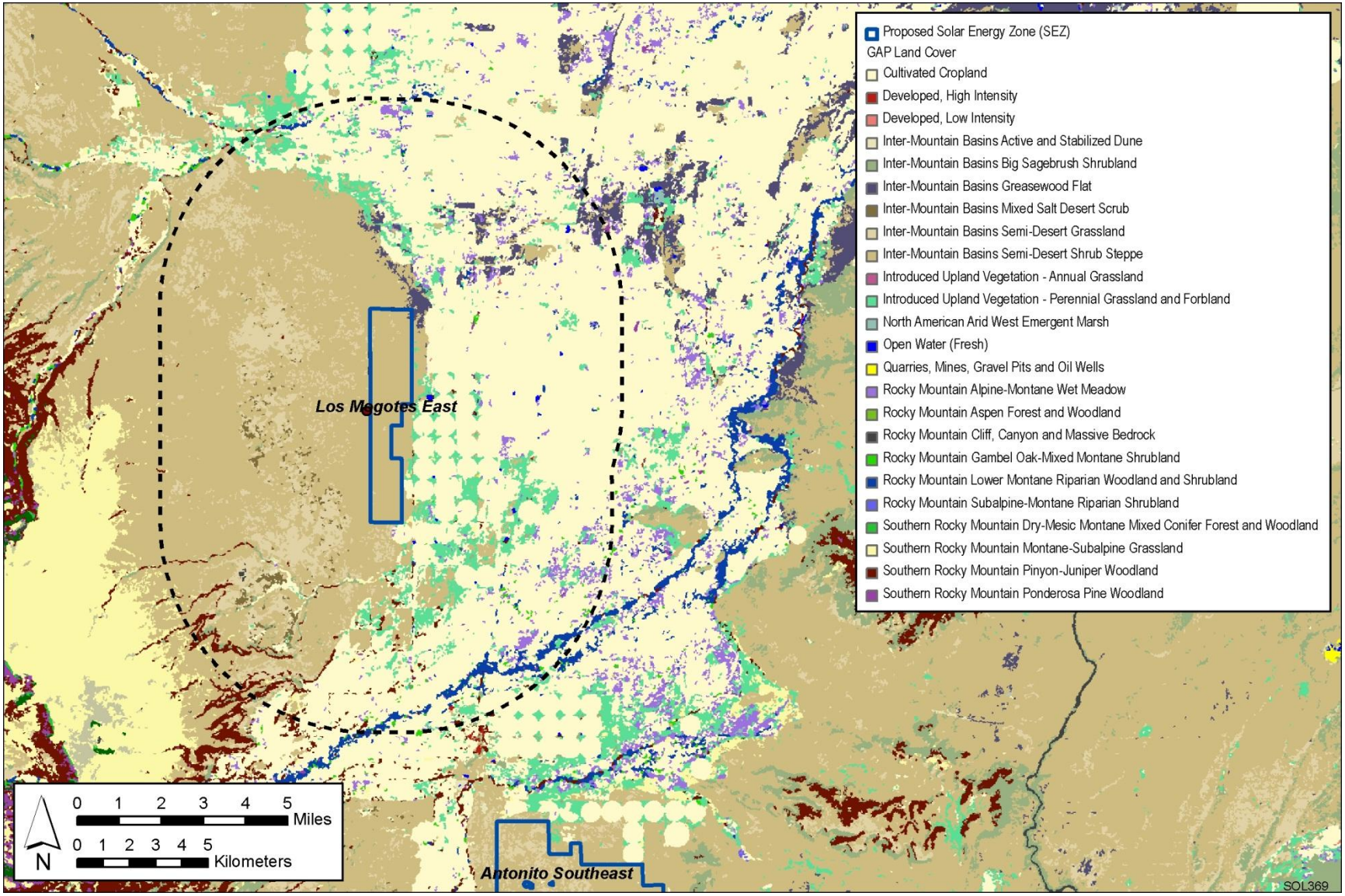

FIGURE 4-8 Proposed Los Mogotes East SEZ and Associated Land Cover Types

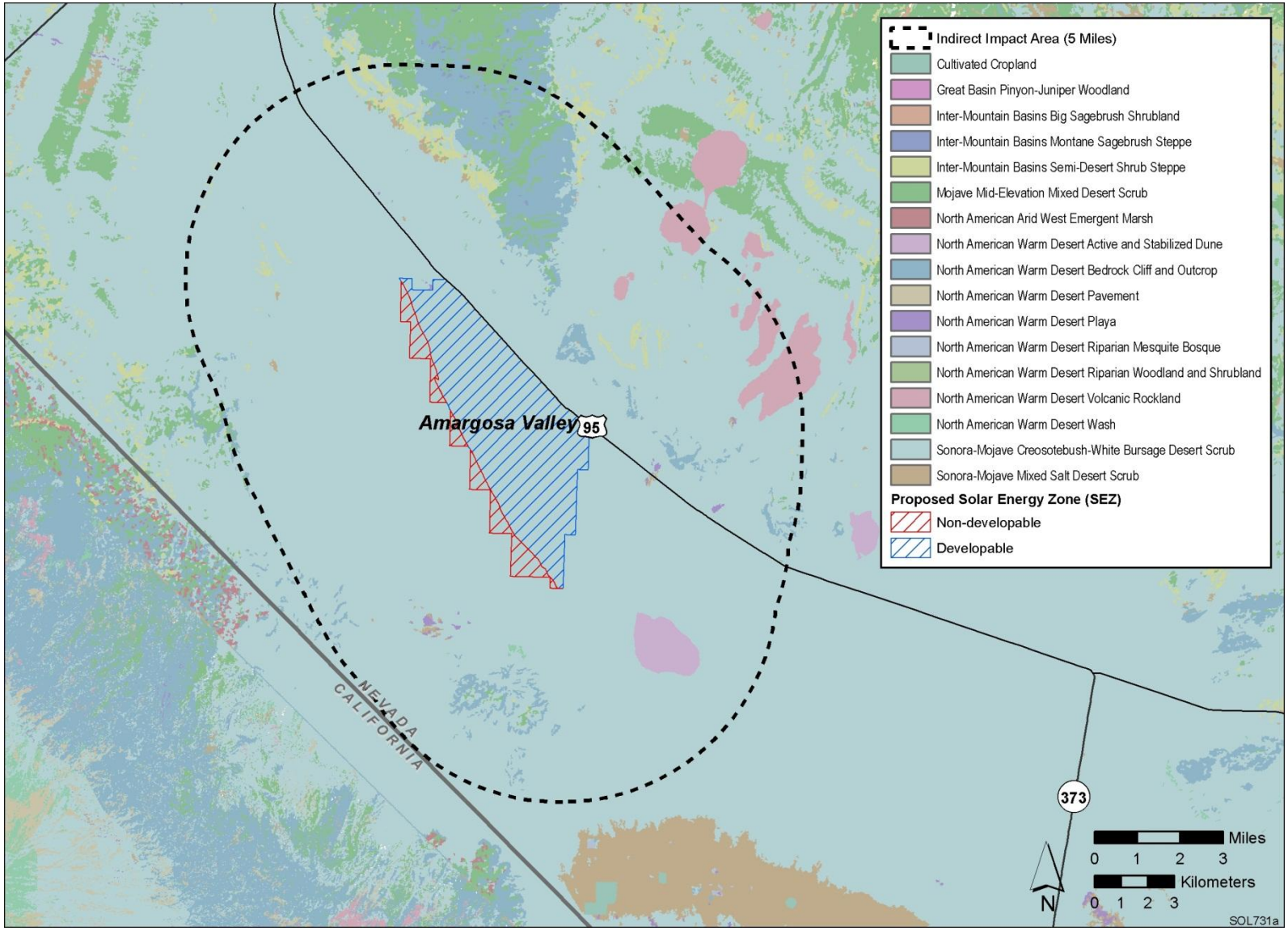

FIGURE 4-9 Proposed Amargosa Valley SEZ and Associated Land Cover Types

U.S. 95, and Amargosa Valley, about 12 mi (20 km) southeast on U.S. 95. Las Vegas is about 84 mi (135 km) southeast.

Access to the Amargosa Valley SEZ is via U.S. 95, which passes along the northeast boundary of the SEZ. Access to the interior of the SEZ is by dirt roads. It was assumed that no new access road development would be needed to serve the Amargosa Valley SEZ (Figure 4-9; Table 4-1).

The proposed Amargosa Valley SEZ is located within the Amargosa Desert Level IV ecoregion, which primarily supports a creosotebush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) community (Bryce et al. 2003). Additional commonly occurring species include wolfberry (*Lycium torreyi*), shadscale (*Atriplex confertifolia*), Joshua tree (*Yucca brevifolia*) and other *Yucca* species, and Indian ricegrass (*Achnatherum hymenoides*), a perennial grass. This internally drained ecoregion includes nearly level to rolling valleys and scattered hills. Extensive underground water systems discharge within this ecoregion, resulting in many springs and seeps, including those at Ash Meadows National Wildlife Refuge (NWR), approximately 20 mi (32 km) southeast of the SEZ. Wetland oases form where the Amargosa River surfaces, and intermittent and ephemeral washes and streams commonly have subsurface flow. Many endemic plants occur in this ecoregion, particularly at Ash Meadows.

The Amargosa Desert lies within the Mojave Basin and Range Level III ecoregion. This ecoregion is characterized by broad basins and scattered mountains. Communities of sparse, scattered shrubs and grasses, including creosotebush, white bursage, and big galleta grass (*Pleuraphis rigida*) occur in basins. Joshua tree, other *Yucca* species, and cacti occur on arid footslopes. Woodland and shrubland communities occur on mountain slopes, ridges, and hills (Bryce et al. 2003). Creosotebush, all-scale (*Atriplex polycarpa*), brittlebush (*Encelia farinosa*), desert holly (*Atriplex hymenelytra*), white burrobrush (*Hymenoclea salsola*), shadscale (*Atriplex confertifolia*), blackbrush (*Coleogyne ramosissima*), and Joshua tree are dominant species within the Mojave desertscrub biome (Turner 1994). Precipitation in the Mojave Desert occurs primarily in winter. Many ephemeral species (winter annuals) germinate in response to winter rains (Turner 1994). Annual precipitation in the vicinity of the SEZ is very low, averaging 4.4 in. (11.3 cm).

The area surrounding the SEZ also includes the Arid Footslopes Level IV ecoregion. This ecoregion supports a sparse mixture of Mojave Desert species, such as creosotebush, white bursage, and *Yucca* species, including Joshua tree on alluvial fans, basalt flows, hills, and low mountains. Cacti occur in rocky areas. Blackbrush is dominant on upper-elevation slopes.

4.4.2 Dry Lake

The proposed Dry Lake SEZ is located in Clark County in southern Nevada. The SEZ has a total developable area of 5,717 acres (23 km^2) (Figure 4-10). In 2008, the county population was 1,879,093. The towns of Moapa Town and Overton are as close as 18 mi (29 km) northeast and 23 mi (37 km) east of the SEZ, respectively.

The nearest major roads accessing the proposed Dry Lake SEZ are Interstate 15, which passes along the southeastern boundary of the SEZ, and U.S. 93, which runs from northwest to southeast along the southwest border of the SEZ. It was assumed that no new access road development would be needed to serve the Dry Lake SEZ (Figure 4-10; Table 4-1).

The proposed Dry Lake SEZ is located primarily within the Creosotebush–Dominated Basins Level IV ecoregion (EPA 2007), which includes stream terraces, floodplains, alluvial fans, and eroded washes, as well as isolated hills, mesas, and buttes (Bryce et al. 2003). Plant communities are characterized by sparse creosotebush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), and big galleta grass (*Pleuraphis rigida*); cacti, yucca (*Yucca* sp.), ephedra (*Ephedra* sp.), and Indian ricegrass (*Achnatherum hymenoides*) are also common, although barren areas occur. In addition, mesquite (*Prosopis* sp.) and acacia (*Acacia* sp.) are present, and blackbrush (*Coleogyne ramosissima*) is common in areas near the Arid Footslopes ecoregion. Riparian habitats include desert willow (*Chilopsis linearis*), coyote willow (*Salix exigua*), and mesquite, with salt cedar (*Tamarix* sp.), a non-native shrub/tree invading riparian areas. Small areas of the northwestern margin of the SEZ are located in the Arid Footslopes Level IV ecoregion. This ecoregion supports a diverse but sparse mixture of Mojave desert forbs, succulents and shrubs, such as creosotebush, white bursage, *Yucca* species, including Joshua tree (*Yucca brevifolia*), winterfat (*Krascheninnikovia lanata*), spiny menodora (*Menodora spinescens*), Nevada ephedra (*Ephedra nevadensis*), big galleta, Indian ricegrass, and annual fescue (*Vulpia myuros*) on alluvial fans, basalt flows, hills, and low mountains (Bryce et al. 2003). Cacti, such as silver cholla (*Cylindropuntia echinocarpa*) and beavertail (*Opuntia basilaris*), occur in rocky areas. Annual plants are abundant with sufficient winter precipitation. The east-central portion of the SEZ is located within the Mojave Playas Level IV ecoregion, which includes broad, nearly level alluvial flats, muddy lake plains, low terraces, sand sheets, and sand dunes (Bryce et al. 2003). These playas are intermittently flooded and mostly barren, with sparse, scattered, highly salt-tolerant vegetation on the margins. Velvet ash (*Fraxinus velutina*), mesquite, or other trees may occur on some playas with sufficient moisture. Scattered creosotebush occurs in some locations. Areas surrounding the SEZ include the Creosotebush–Dominated Basins and Arid Footslopes ecoregions.

These ecoregions are located within the Mojave Basin and Range Level III ecoregion. The Mojave Basin and Range Level III ecoregion is characterized by broad basins and scattered mountains. Communities of sparse, scattered shrubs and grasses, including creosotebush, white bursage, and big galleta grass, occur in basins. Joshua tree, other *Yucca* species, and cacti occur on arid footslopes. Woodland and shrubland communities occur on mountain slopes, ridges, and hills (Bryce et al. 2003). Creosotebush, all-scale (*Atriplex polycarpa*), brittlebush (*Encelia farinosa*), desert holly (*Atriplex hymenelytra*), white burrobrush (*Hymenoclea salsola*), shadscale (*Atriplex confertifolia*), blackbrush, and Joshua tree are dominant species within the Mojave desertscrub biome (Turner 1994). Precipitation in the Mojave Desert occurs primarily in winter. Many ephemeral species (winter annuals) germinate in response to winter rains (Turner 1994). Annual precipitation in the vicinity of the SEZ is low, averaging about 6.5 in. (16.4 cm).

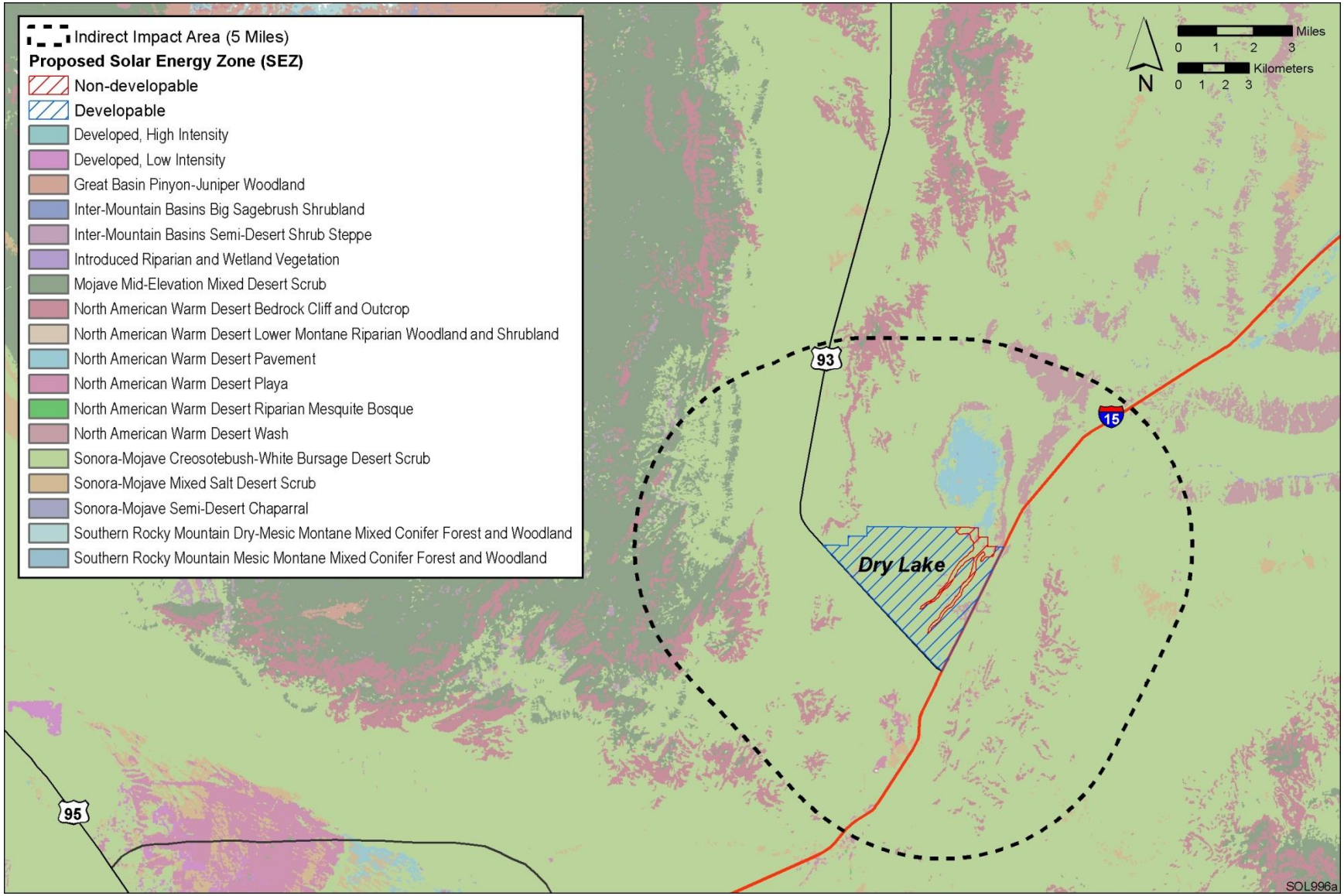

FIGURE 4-10 Proposed Dry Lake SEZ and Associated Land Cover Types

4.4.3 Dry Lake Valley North

The proposed Dry Lake Valley North SEZ is located in Lincoln County in southeastern Nevada. The SEZ has a total developable area of 25,069 acres (101 km^2) (Figure 4-11). In 2008, the county population was 4,643, while adjacent Clark County to the south had a population of 1,879,093. The closest population centers to the SEZ are Pioche, located about 15 mi (24 km) to the east, and Caliente, located about 15 mi (24 km) to the southeast; both communities have populations of about 1,000.

The nearest major road to the Dry Lake Valley North SEZ is State Route 318, which is about 7 mi (11 km) to the west of the SEZ, while U.S. 93 is about 8 mi (13 km) to the south. Access to the interior of the SEZ is by dirt roads. It was assumed that a new access road would be needed to connect the SEZ to U.S. 93 (Figure 4-11; Table 4-1).

The proposed Dry Lake Valley North SEZ is located primarily within the Shadscale-Dominated Saline Basins Level IV ecoregion, which supports shadscale (*Atriplex confertifolia*) and black greasewood (*Sarcobatus vermiculatus*) low scrub communities in valley bottoms, and also includes remnant lake terraces and scattered sand dunes (Bryce et al. 2003). This internally drained nearly flat to gently sloping ecoregion includes soils with high salt and alkali content, which are dry for extended periods. Additional commonly occurring species include bud sagebrush (*Picrothamnus desertorum*), fourwing saltbrush (*Atriplex canescens*), rubber rabbitbrush (*Ericameria nauseosa*), alkali sacaton (*Sporobolus airoides*), bottlebrush squirreltail (*Elymus elymoides*), inland saltgrass (*Distichlis spicata*), Indian ricegrass (*Achnatherum hymenoides*), Great Basin wildrye (*Leymus cinereus*), and galleta (*Pleuraphis jamesii*). The southwestern portion of the SEZ is located within the Salt Deserts Level IV ecoregion, which contains nearly level playas, salt flats, mud flats, and saline lakes (Bryce et al. 2003). These habitats are mostly barren and may be salt encrusted in dry periods. Scattered plants are salt tolerant and include pickleweed (*Salicornia* sp.), seepweed (*Suaeda fruticosa*), iodine bush (*Allenrolfea occidentalis*), black greasewood, alkali sacaton, and inland saltgrass. Scattered sand dunes also occur in this ecoregion, and perennial and intermittent springs are common. The southeastern portion is located within the Carbonate Sagebrush Valleys Level IV ecoregion, which supports sparse Great Basin sagebrush shrub communities of black sagebrush (*Artemisia nova*) and winterfat (*Krascheninnikovia lanata*), with grasses such as blue grama (*Bouteloua gracilis*) (Bryce et al. 2003). Additional species include Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), rabbitbrush (*Ericameria* sp./*Chrysothamnus* sp.), bottlebrush squirreltail, Indian ricegrass, and cheatgrass (*Bromus tectorum*). Annual precipitation in the vicinity of the SEZ is very low, averaging 8.7 in. (22.2 cm).

4.4.4 Gold Point

The proposed Gold Point SEZ is located in Esmeralda County in southwestern Nevada. The SEZ has a total developable area of 4,596 acres (19 km^2) (Figure 4-12). In 2008, the county population was 664, while adjacent Nye County to the east had a population of 44,175. There are no incorporated towns in close proximity to the SEZ. The town of Tonopah is approximately

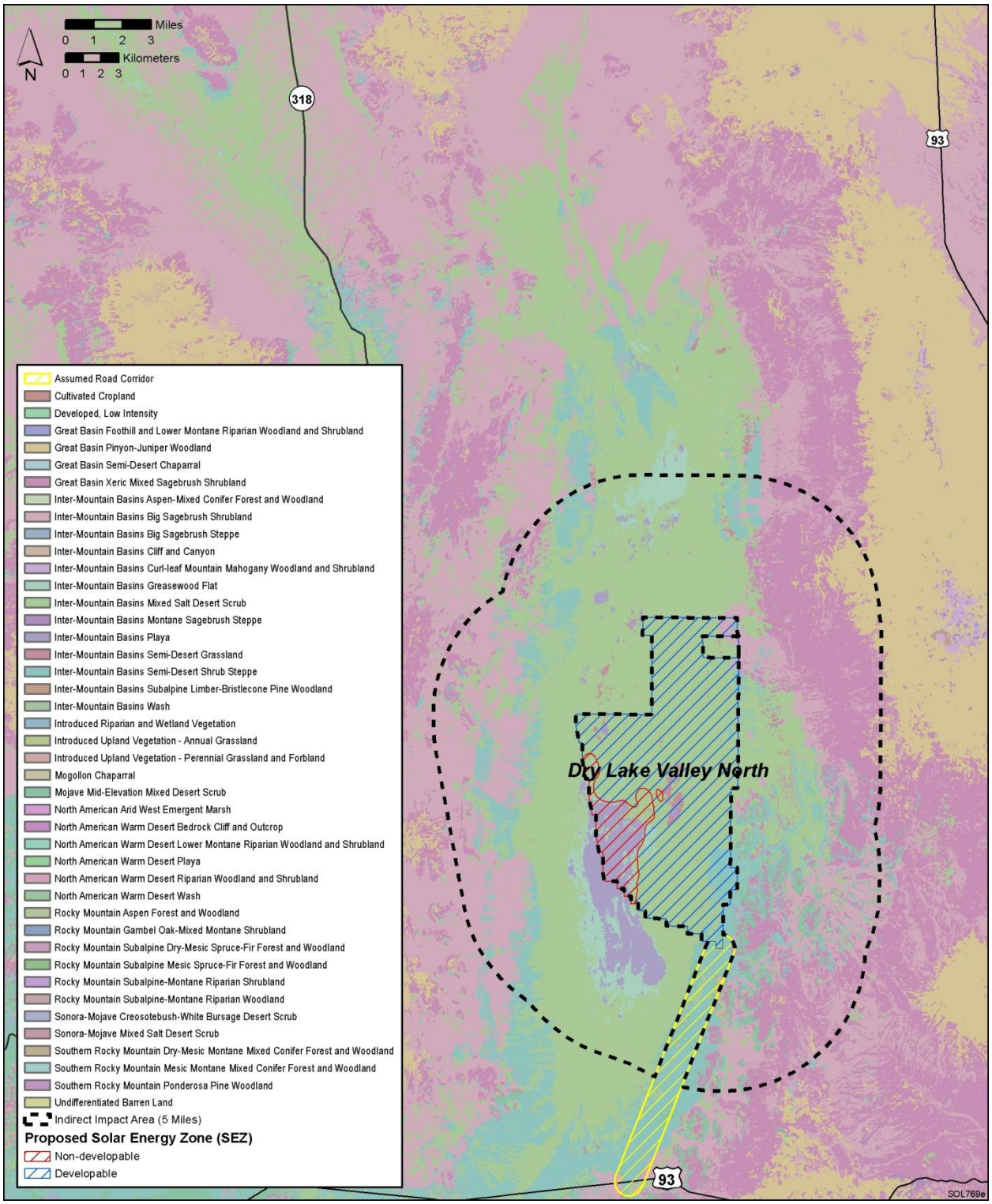

FIGURE 4-11 Proposed Dry Lake Valley North SEZ and Associated Land Cover Types

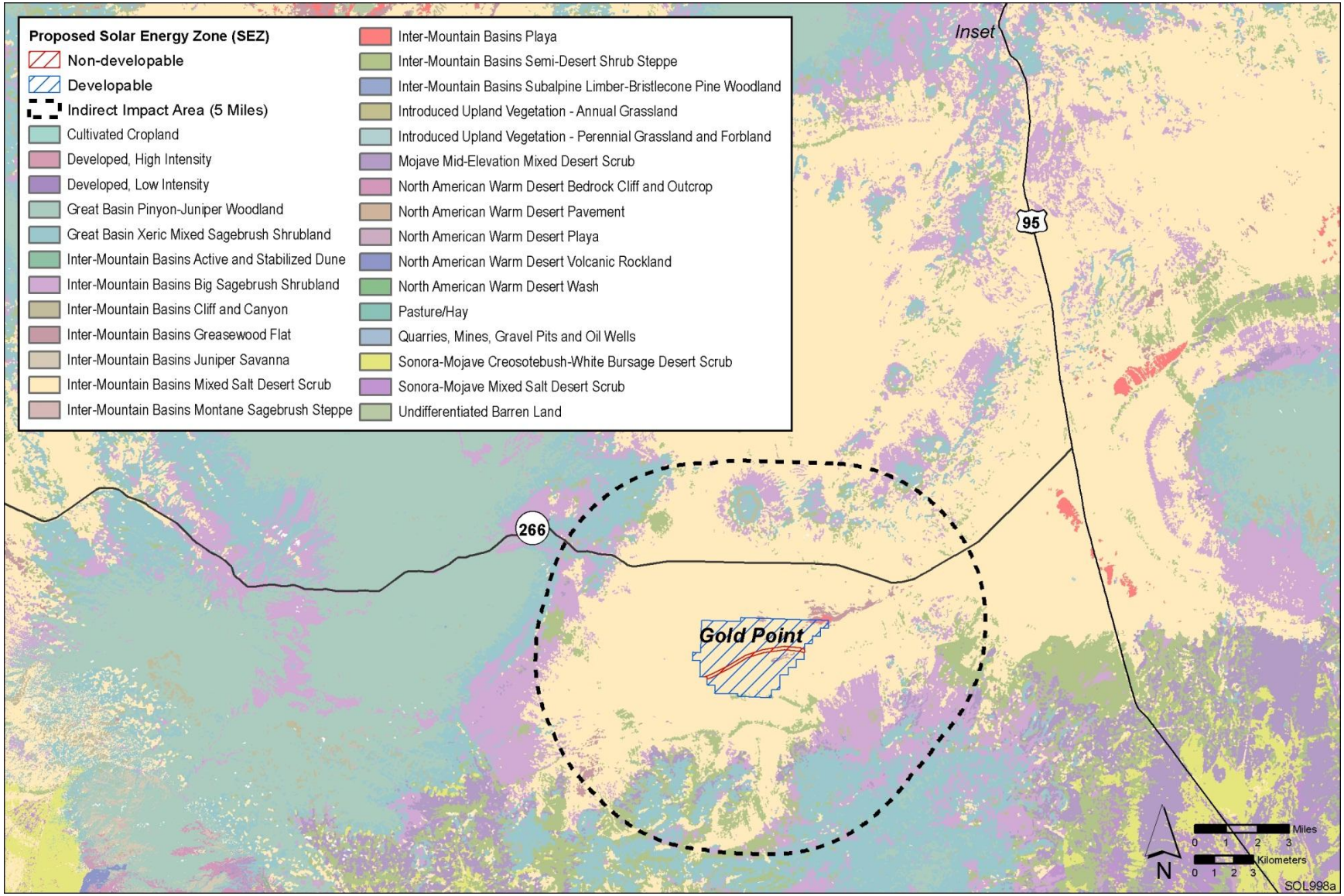

FIGURE 4-12 Proposed Gold Point SEZ and Associated Land Cover Types

50 mi (80 km) to the north, and the Las Vegas metropolitan area is approximately 180 mi (290 km) to the southeast of the SEZ.

The nearest major road access to the proposed Gold Point SEZ is State Route 774, which parallels the eastern edge of the SEZ; U.S. 95 runs north–south as it passes within 9 mi (14 km) to the east of the SEZ. It was assumed that no new access road development would be needed to serve the Gold Point SEZ (Figure 4-12; Table 4-1).

The proposed Gold Point SEZ is located primarily within the Tonopah Basin Level IV ecoregion, which primarily supports sparse shadscale (*Atriplex confertifolia*) communities on broad valleys, hills, bajadas, and alluvial fans (Bryce et al. 2003). Additional commonly occurring shrubs in this ecoregion include bud sagebrush (*Picrothamnus desertorum*), spiny hopsage (*Grayia spinosa*), seepweed (*Suaeda* sp.), fourwing saltbush (*Atriplex canescens*), spiny menodora (*Menodora spinescens*), Nevada ephedra (*Ephedra nevadensis*), littleleaf horsebrush (*Tetradymia glabrata*), Douglas rabbitbrush (*Chrysothamnus viscidiflorus*), and winterfat (*Krascheninnikovia lanata*), which, along with shadscale, often co-dominate in highly diverse mosaics. Warm season grasses, such as Indian rice grass (*Achnatherum hymenoides*) and galleta grass (*Pleuraphis jamesii*), occur in the understory. Stands of inland saltgrass (*Distichlis spicata*) and alkali sacaton (*Sporobolus airoides*) also occur. Bailey greasewood (*Sarcobatus baileyi*) and Shockley wolfberry (*Lycium* sp.) are widespread and often co-dominate on lower alluvial slopes in this ecoregion. Black greasewood (*Sarcobatus vermiculatus*) occurs in saline bottoms. Springs and sporadic precipitation in foothills provide surface water sources.

The Tonopah Basin ecoregion lies within the Central Basin and Range Level III ecoregion, which is part of the Great Basin desertscrub biome. Annual precipitation in the vicinity of the SEZ is low, averaging about 6.1 in. (15.4 cm).

4.4.5 Millers

The proposed Millers SEZ is located in Esmeralda County in southern Nevada, 44 mi (71 km) east of the California border. The SEZ has a total developable area of 16,534 acres (67 km^2) (Figure 4-13). In 2008, the county population was 664, while adjacent Nye County to the west had a population of 44,175. The nearest town is Tonopah, Nevada, about 15 mi (24 km) west in Nye County, with a population of approximately 1,500.

The nearest major road access to the proposed SEZ is via U.S. 95/U.S. 6, which runs east–west along its southern border. It was assumed that no new access road development would be needed to serve the Millers SEZ (Figure 4-13; Table 4-1).

The proposed Millers SEZ is located primarily within the Tonopah Basin Level IV ecoregion, which primarily supports sparse shadscale (*Atriplex confertifolia*) communities on broad valleys, hills, bajadas, and alluvial fans (Bryce et al. 2003). Additional commonly occurring shrubs in this ecoregion include bud sagebrush (*Picrothamnus desertorum*), spiny hopsage (*Grayia spinosa*), seepweed (*Suaeda* sp.), fourwing saltbush (*Atriplex canescens*), spiny menodora (*Menodora spinescens*), Nevada ephedra (*Ephedra nevadensis*), littleleaf horsebrush

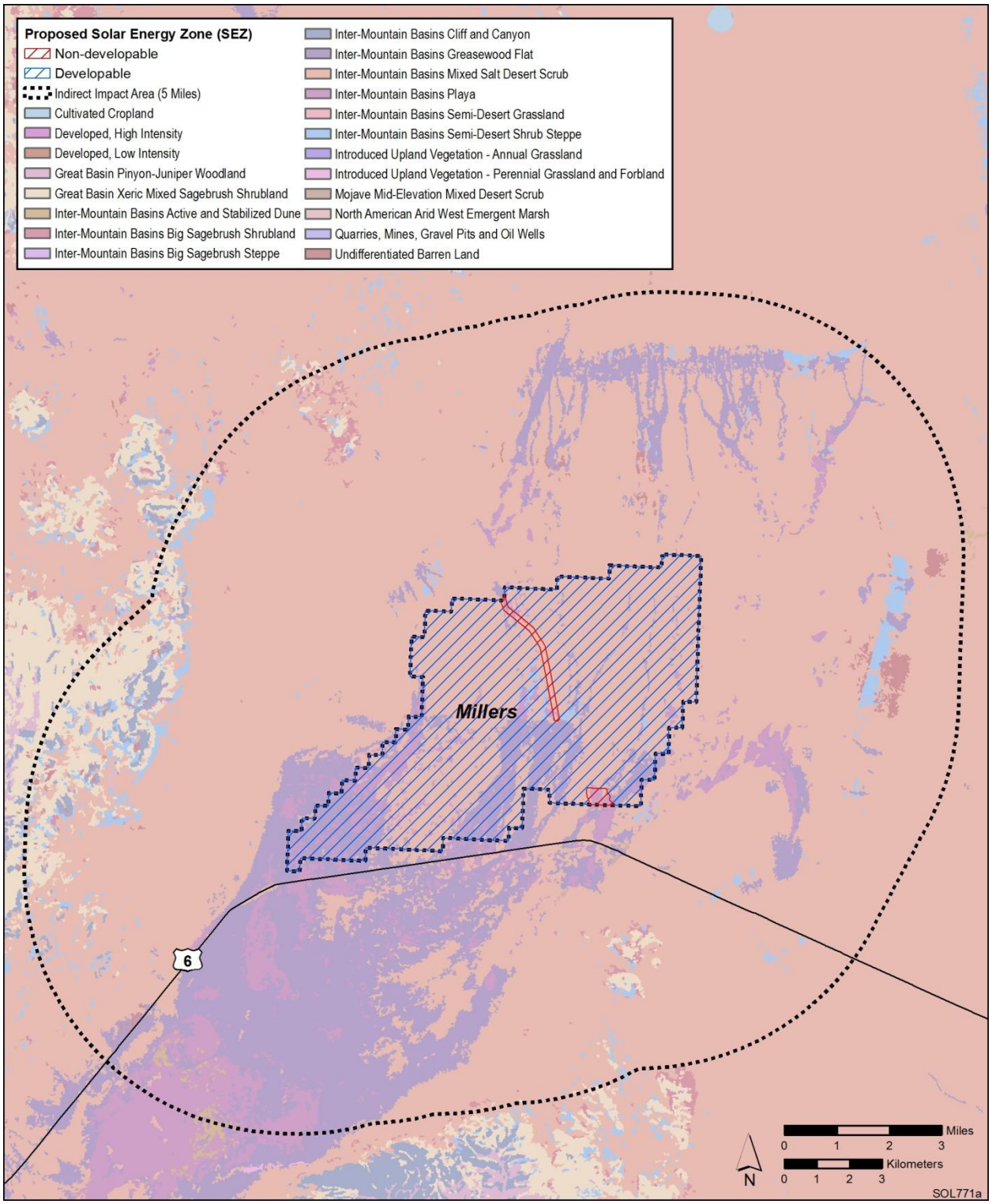

FIGURE 4-13 Proposed Millers SEZ and Associated Land Cover Types

(*Tetradymia glabrata*), Douglas rabbitbrush (*Chrysothamnus viscidiflorus*), and winterfat (*Krascheninnikovia lanata*), which, along with shadscale, often co-dominate in highly diverse mosaics. Warm season grasses, such as Indian ricegrass (*Achnatherum hymenoides*) and galleta grass (*Pleuraphis jamesii*), occur in the understory. Stands of inland saltgrass (*Distichlis spicata*) and alkali sacaton (*Sporobolus airoides*) also occur. Bailey greasewood (*Sarcobatus baileyi*) and Shockley wolfberry (*Lycium* sp.) are widespread and often co-dominate on lower alluvial slopes in this ecoregion. Black greasewood occurs in saline bottoms. Springs and sporadic precipitation in foothills provide surface water sources. The southwestern portion of the Millers SEZ is located within the Lahontan and Tonopah Playas. This Level IV ecoregion is nearly level and contains mud flats, alkali flats, intermittent saline lakes, and low sand dunes. Marshes, remnant lakes, and playas occur within this ecoregion. Rivers terminate in the playas, which during winter fill with seasonal runoff from nearby mountains. Only scattered, highly salt-tolerant plants, such as alkali sacaton, inland saltgrass, and seepweed, occur in this mostly barren ecoregion. Bordering the playas, black greasewood (*Sarcobatus vermiculatus*) or fourwing saltbush may form a transition to the salt shrub community. Playas may be sources of wind-generated salt dust.

The Tonopah Basin and Lahontan and Tonopah Playas ecoregions lie within the Central Basin and Range Level III ecoregion, which is part of the Great Basin desertscrub biome. Annual precipitation in the vicinity of the SEZ is low, averaging about 5.1 in. (12.9 cm).

4.5 NEW MEXICO SEZS

4.5.1 Afton

The proposed Afton SEZ is located in Doña Ana County in southern New Mexico, 21 mi (34 km) north of the border with Mexico (Figure 4-14). The SEZ has a total developable area of 29,964 acres (121 km^2). In 2008, the county population was 206,486. The towns of Las Cruces, Mesilla, Mesquite, University Park, and Vado are all within a 5-mi (8-km) radius of the SEZ. Las Cruces is the largest, with a population of approximately 90,000.

The nearest major road access to the SEZ is via Interstate 10, which runs east–west along approximately 3 mi (5 km) north of the Afton SEZ border. Access to the interior of the SEZ is by dirt roads. Therefore, it was assumed that a new access road would be needed to connect the SEZ to Interstate 10 (Figure 4-14; Table 4-1).

The proposed Afton SEZ is located primarily within the Chihuahuan Basins and Playas Level IV ecoregion (EPA 2007), which supports communities of desert shrubs and grasses on alluvial fans, flat to rolling internally drained basins, and river valleys, and includes areas of saline and alkaline soils, salt flats, sand dunes, and areas of windblown sand (Griffith et al. 2006). The dominant species of the desert shrubland is creosotebush (*Larrea tridentata*), with tarbush (*Flourensia cernua*), yuccas (*Yucca* spp.), sand sage (*Artemisia filifolia*), viscid acacia (*Acacia neovernicosa*), tasajillo (*Cylindropuntia leptocaulis*), lechuguilla (*Agave lechuguilla*), and mesquite (*Prosopis* sp.) also occurring frequently. Gypsum areas support gyp grama

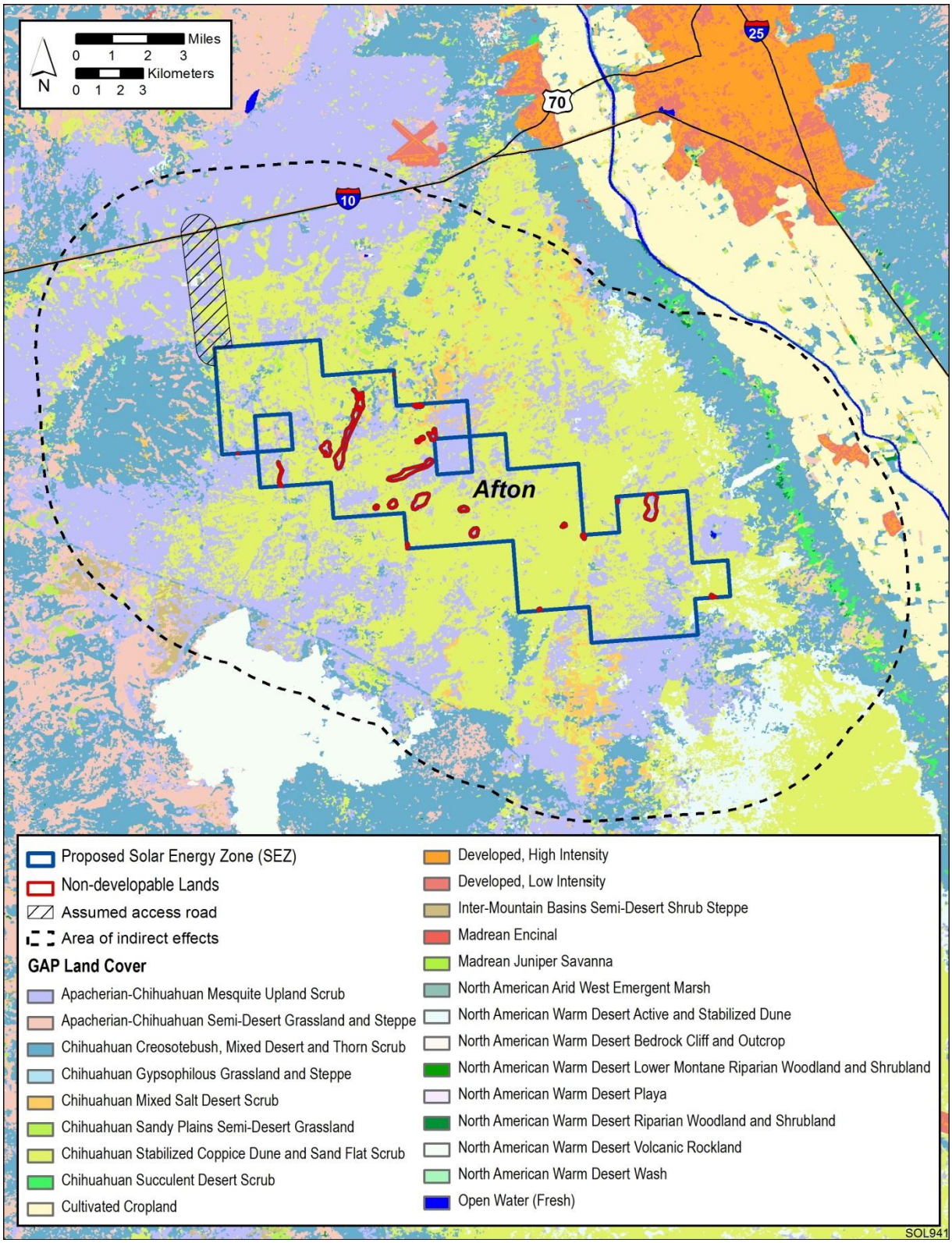

FIGURE 4-14 Proposed Afton SEZ and Associated Land Cover Types

(*Bouteloua breviseta*), gyp mentzelia (*Mentzelia humulis*), and Torrey ephedra (*Ephedra torreyana*). Fourwing saltbush (*Atriplex canescens*), seepweed (*Suaeda* sp.), pickleweed (*Allenrolfea occidentalis*), and alkali sacaton (*Sporobolus airoides*) occur on saline flats and along alkaline playa margins. Cacti, including horse crippler (*Echinocactus texensis*), are common in this ecoregion. Small areas in the eastern portion of the SEZ are located within the Rio Grande Floodplain ecoregion. This ecoregion supports riparian woodlands and shrublands along with agricultural areas (Griffith et al. 2006). Riparian habitats include cottonwood (*Populus* sp.)–willow (*Salix* sp.) communities, along with velvet ash (*Fraxinus velutina*), screwbean mesquite (*Prosopis pubescens*), seep willow (*Baccharis salicifolia*), alkali sacaton, skunkbush (*Rhus trilobata*), and creosotebush. Salt cedar (*Tamarix chinensis*), a woody invasive species, dominates some riparian areas. These ecoregions are located within the Chihuahuan Deserts Level III ecoregion. Annual precipitation in the Chihuahuan Desert occurs mostly in summer (Brown 1994) and is low in the area of the SEZ, averaging about 9.4 in. (24 cm).

4.6 UTAH SEZS

4.6.1 Escalante Valley

The proposed Escalante Valley SEZ is located in Iron County in southwestern Utah (Figure 4-15). The SEZ has a total developable area of 6,533 acres (26 km^2). In 2008, the county population was 45,833, while adjacent Washington County to the south had a population of 148,256. The largest nearby town is Cedar City on Interstate 15 in Iron County; Cedar City had a 2008 population of 28,667 and is located about 30 mi (48 km) to the east-southeast. Several small towns are located closer to the SEZ; Lund is about 4 mi (6 km) to the north, and Zane is about 5 mi (8 km) to the west. Salt Lake City is located about 220 mi (354 km) to the north–northeast.

The nearest major road is State Route 56, about 15 mi (24 km) southeast of the SEZ. Access to the Escalante Valley SEZ is via county road; Lund Highway passes northeast of the SEZ. Access to the interior of the SEZ is by dirt roads. It was assumed that a new access road would be needed to connect the SEZ to State Route 56 (Figure 4-15; Table 4-1).

Much of the proposed Escalante Valley SEZ is located within the Shadscale-dominated Saline Basins Level IV ecoregion, which primarily supports a sparse saltbush-greasewood shrub community (Woods et al. 2001). This ecoregion includes nearly flat to gently sloping valley bottoms and lower hill slopes. Soils have a high salt and alkali content, and plants are salt and drought tolerant. The dominant shrub species in this ecoregion are shadscale (*Atriplex confertifolia*), winterfat (*Krascheninnikovia lanata*), greasewood (*Sarcobatus vermiculatus*), and bud sagebrush (*Picrothamnus desertorum*). Perennial grasses are also typically present and include bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (*Achnatherum hymenoides*), and galleta (*Pleuraphis jamesii*). Much of the western portion of the SEZ lies within the Salt Deserts Level IV ecoregion. This ecoregion is mostly barren and contains playas, salt flats, mud flats, low terraces, and saline lakes. Playas and salt flats are ponded during wet periods and subject to wind erosion when they are dry. Soils are poorly drained, have a high salt and alkali

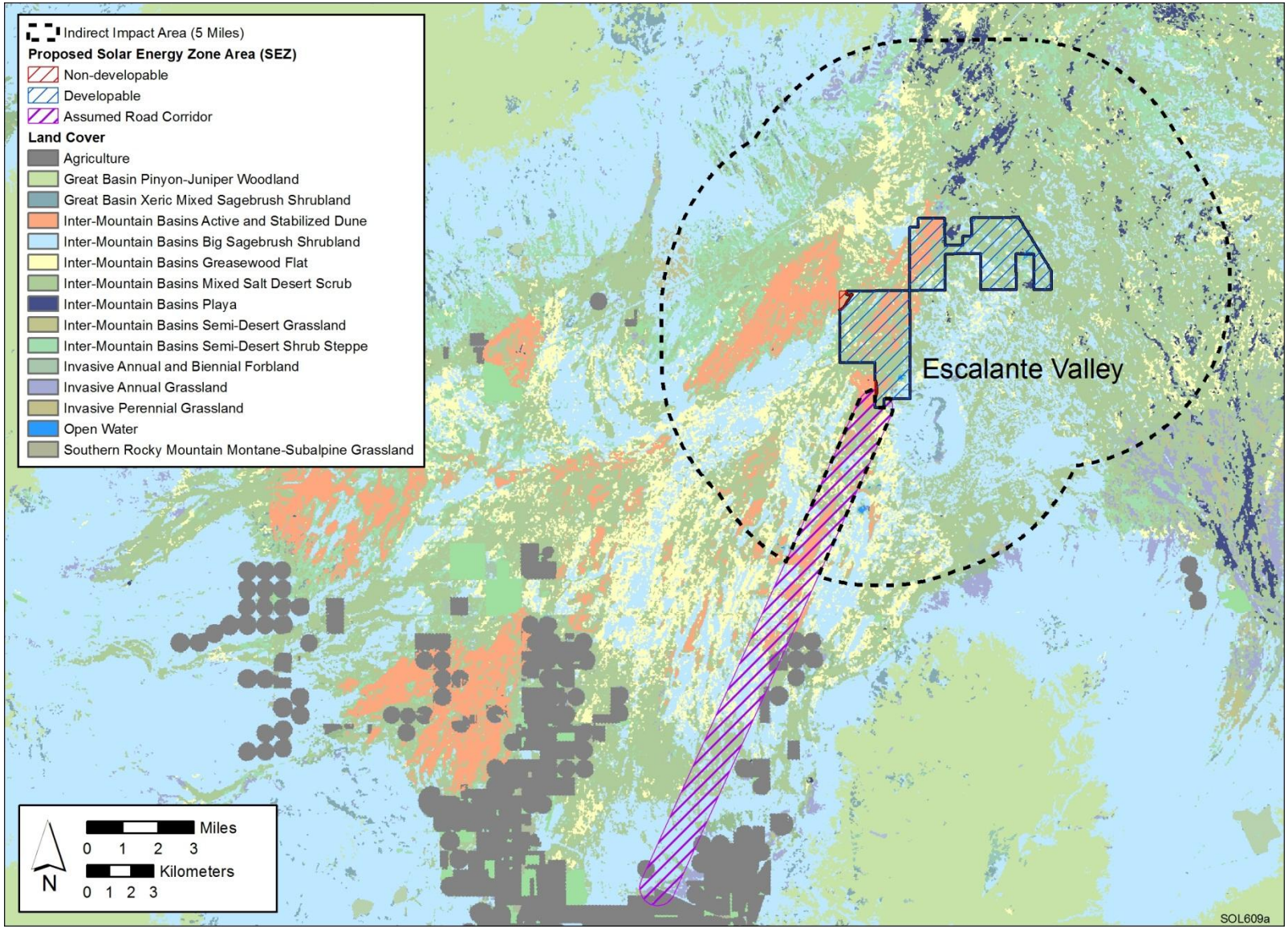

FIGURE 4-15 Proposed Escalante Valley SEZ and Associated Land Cover Types

content, and are often salt-crusted. Plants in this ecoregion are generally sparse and widely scattered, if present at all, and include extremely salt-tolerant species such as salicornia (*Salicornia* sp.), saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), iodine bush (*Allenrolfea occidentalis*), and greasewood. Annual precipitation in the vicinity of the SEZ is low, averaging 10 in. (25.4 cm).

4.6.2 Milford Flats South

The proposed Milford Flats South SEZ (Figure 4-16) is located in Beaver County in southwestern Utah about 21 mi (34 km) northeast of the Escalante Valley SEZ. The SEZ has a total developable area of 6,252 acres (25 km^2). In 2008, the county population was 7,265, while adjacent Iron County to the south had a population of 45,833. The largest nearby city is Cedar City, about 30 mi (48 km) south–southeast in Iron County. Several small towns are located closer to the SEZ; Minersville is about 5 mi (8 km) east, and Milford is about 13 mi (21 km) north-northeast. Salt Lake City is about 200 mi (322 km) to the north-northeast.

The nearest major road is State Route 21/130, about 5 mi (8 km) east in Minersville. A smaller spur of State Route 129 is about 3 mi (5 km) northwest of the SEZ. Access to the Milford Flats South SEZ is by county and local roads. Access to the interior of the SEZ is by dirt roads. It was assumed that a new access road would be needed to connect the SEZ to State Route 21/130 (Figure 4-16; Table 4-1).

Most of the western and southern portions of the proposed Milford Flats South SEZ are located within the Shadscale-dominated Saline Basins Level IV ecoregion, which primarily supports a sparse saltbush-greasewood shrub community (Woods et al. 2001). This ecoregion includes nearly flat to gently sloping valley bottoms and lower hillslopes. Soils have a high salt and alkali content, and plants are salt and drought tolerant. The dominant shrub species in this ecoregion are shadscale (*Atriplex confertifolia*), winterfat (*Krascheninnikovia lanata*), greasewood (*Sarcobatus vermiculatus*), and bud sagebrush (*Picrothamnus desertorum*). Perennial grasses are also typically present and include bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (*Achnatherum hymenoides*), and galleta (*Pleuraphis jamesii*). Most of the eastern portion of the SEZ is within the Sagebrush Basins and Slopes Level IV ecoregion, which supports a Great Basin sagebrush community dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and includes perennial bunchgrasses. This ecoregion includes valleys, alluvial fans, bajadas, mountain flanks, and stream terraces. Annual precipitation in the vicinity of the SEZ is low, averaging 9.03 in. (22.9 cm).

4.6.3 Wah Wah Valley

The proposed Wah Wah Valley SEZ (Figure 4-17) is located in Beaver County in southwestern Utah about 21 mi (34 km) northwest of the proposed Milford Flats South SEZ. The SEZ has a total developable area of 5,873 acres (24 km^2). In 2008, the county population was 7,265, while adjacent Iron County to the south had a population of 45,833. The largest nearby

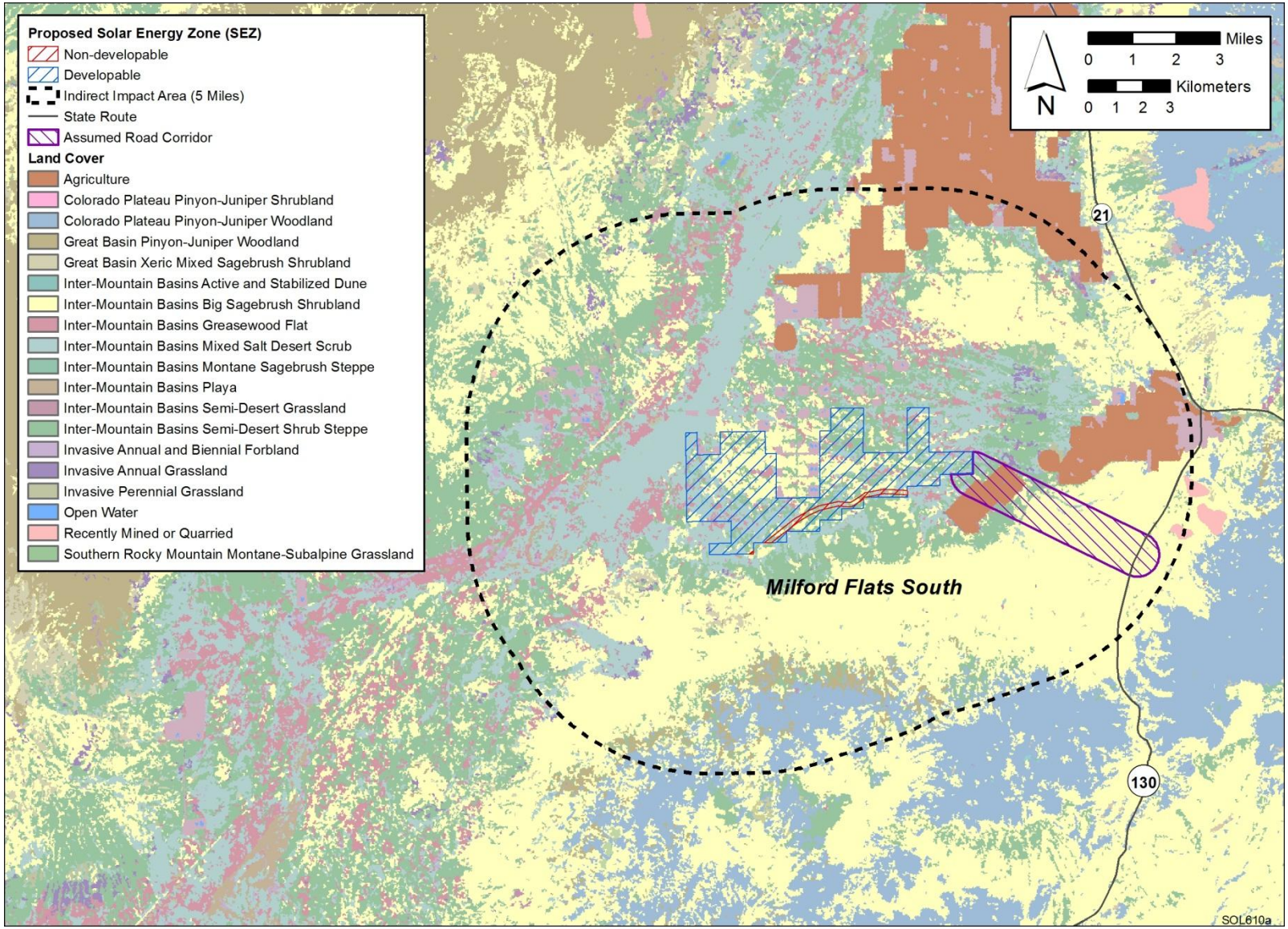

FIGURE 4-16 Proposed Milford Flats South SEZ and Associated Land Cover Types

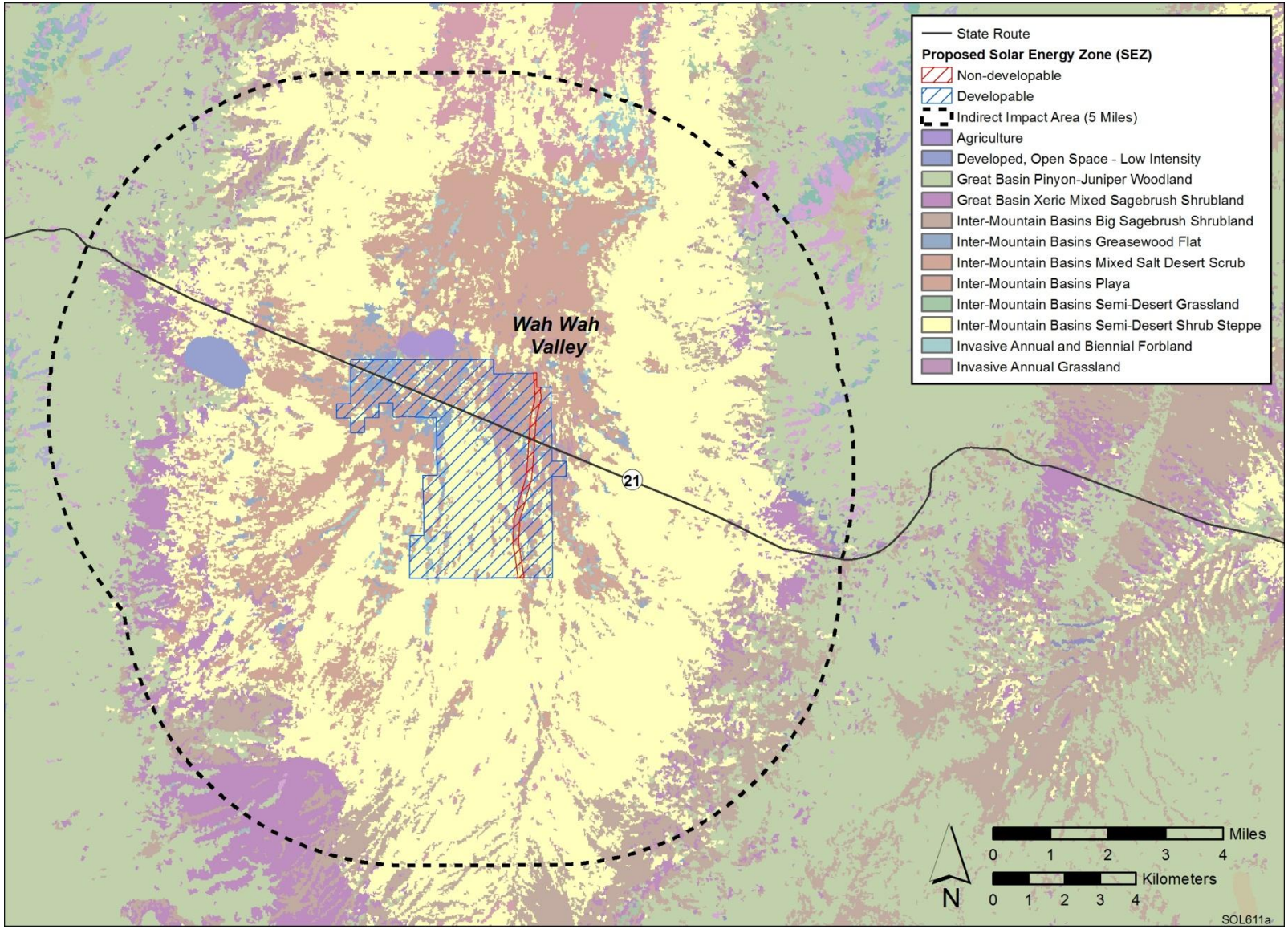

FIGURE 4-17 Proposed Wah Wah Valley SEZ and Associated Land Cover Types

town is Cedar City, Utah, about 50 mi (80 km) southeast in Iron County. The town of Milford is located about 23 mi (37 km) east. Salt Lake City lies about 200 mi (322 km) north–northeast.

There is good access to the SEZ from State Route 21, which runs west–east through the northern half of the SEZ. It was assumed that no new access road development would be needed to serve the Wah Wah Valley SEZ (Figure 4-17; Table 4-1).

The proposed Wah Wah Valley SEZ is located within the Shadscale-Dominated Saline Basins Level IV ecoregion, which primarily supports a sparse saltbush-greasewood shrub community (Woods et al. 2001). This ecoregion includes nearly flat to gently sloping valley bottoms and lower hill slopes. Soils have a high salt and alkali content, and plants are salt and drought tolerant. The dominant shrub species in this ecoregion are shadscale (*Atriplex confertifolia*), winterfat (*Krascheninnikovia lanata*), greasewood (*Sarcobatus vermiculatus*), and bud sagebrush (*Picrothamnus desertorum*). Perennial grasses are also typically present and include bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (*Achnatherum hymenoides*), and galleta (*Pleuraphis jamesii*). Annual precipitation in the vicinity of the SEZ is low, averaging 6.77 in. (17.2 cm).

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5 EFFECTS OF THE PROPOSED ACTION ON LISTED SPECIES

This section presents the effects of the proposed action on listed species. Section 5.1 describes the general and technology-specific effects that would occur as a consequence of solar energy development under the proposed action if the design features described in Section 2.2 that are intended to reduce impacts and that would be required for all projects were not implemented. Impacts would be dependent on the specific characteristics of areas to be developed, the resources and species present in project areas, and project-specific characteristics such as the technology to be used, the water requirements of the project, the size of the project footprint, and the need for earth moving and other alteration of surface features. The actual project-specific impacts could differ from those described here.

Section 5.2 presents the potential effects of solar energy development under the proposed action on species that could occur outside of the affected areas of the 17 proposed SEZs, assuming design features described in Section 2.2 are implemented.

Given the uncertainty in size and location of solar energy projects within the SEZs, an accurate analysis of impacts from transmission ROW development or upgrade cannot be performed at this time. General impacts associated with transmission ROW development or upgrade are provided below in Section 5.1.1.5; a programmatic quantification of potential impacts from transmission developments is provided in Section 6. The impact of transmission ROW development and upgrade will need to be evaluated at the project level in consultation with the Service.

5.1 EFFECTS OF SOLAR ENERGY DEVELOPMENT ON SPECIES AND HABITATS

Twenty-one species that are listed as threatened or endangered under the ESA could occur in areas that may be directly or indirectly affected by solar energy development in designated SEZs. Impacts on these species could result from site characterization, facility construction, operations, and decommissioning. Impacts would be directly related to the amount of land disturbance, the duration and timing of construction and operation periods, and the habitats affected by development (i.e., the location of the project). Indirect effects, such as those resulting from the erosion of disturbed land surfaces and disturbance and harassment of animal species, are also possible, but their magnitude is considered proportional to the amount of land disturbance.

5.1.1 Impacts Common to All Solar Technologies

Impacts can vary considerably according to the solar energy technology deployed at a site. This section describes impacts common to all technologies and is presented according to project phase (i.e., site characterization, construction, operations, and decommissioning). Impacting factors, project phase, potential consequences, the expected relative impact on different taxonomic groups, and the ability to reduce impacts are summarized in Table 5-1.

TABLE 5-1 Potential Impacts on Federally Listed Species Associated with Utility-Scale Solar Energy Facilities, Including Associated Access Roads

Impacting Factor	Project Phase	Potential Consequences	Potential Relative Impact[a] for Different Species Groups[b]				Ability to Reduce Impacts[c]
			None	Small	Moderate	Large	
Individual Impacting Factor[d]							
Alteration of topography and drainage patterns	Construction, operations	Changes in surface temperature, soil moisture, and hydrologic regimes and in distribution and extent of aquatic, wetland, and riparian habitats; erosion; changes in groundwater recharge; spread of invasive species.	None	Terrestrial reptiles, mammals	Terrestrial plants, invertebrates, amphibians, and birds	Aquatic, wetland, and riparian plant and animals species	Can be reduced by avoiding development of drainages and using appropriate stormwater management strategies.
Blockage of dispersal and movement	Construction, operations	Genetic isolation, loss of access to important habitats, reduction in diversity, reduction in carrying capacity.	All plants	Invertebrates, fish, birds, bats	Amphibians, reptiles, small mammals	Large mammals	Can be reduced by restricting project size, avoiding important movement corridors.
Erosion	Construction operations, decommissioning	Habitat degradation; loss of plants; sedimentation of adjacent areas especially aquatic, wetland systems; loss of productivity; reduction in carrying capacity; spread of invasive species.	None	Terrestrial plants, invertebrates, amphibians, reptiles, birds, mammals	Aquatic, wetland, and riparian plant and animals species	None	Easily reduced with standard erosion control practices.
Equipment noise	Site characterization, construction, operations, decommissioning	Behavioral disturbance, harassment, nest abandonment, avoidance of areas, territory adjustments, reduction in carrying capacity.	All plants, invertebrates	Amphibians, reptiles, and small mammals	Birds, large mammals	None	Can be reduced by using mufflers and other sound-dampening devices.

TABLE 5-1 (Cont.)

Impacting Factor	Project Phase	Consequence	Potential Relative Impact[a] for Different Species Groups[b]				Ability to Reduce Impacts[c]
			None	Small	Moderate	Large	
Individual Impacting Factor[d] (Cont.)							
Fugitive dust	Site characterization, construction, operations, decommissioning	Decrease in photosynthesis, reduction in productivity, increased turbidity and sedimentation in aquatic habitat, spread of invasive species.	None	Animals	All plants	None	Can be reduced by retaining vegetative cover, soil covers, or soil-stabilizing agents.
Groundwater withdrawal	Construction, operations	Change in hydrologic regime, reduction in surface water, reduction in soil moisture, reduction in productivity.	None	Terrestrial plants and animals	Aquatic, wetland, and riparian plants and animals	None	Can be reduced by reducing water consumption requirements. May be difficult to reduce for all but photovoltaic (PV) systems.
Habitat fragmentation	Construction, operations	Genetic isolation, loss of access to important habitats, reduction in diversity, reduction in carrying capacity, spread of invasive species.	None	None	All plants and animals	None	Difficult to reduce; requires minimizing disruption of intact communities especially by linear features such as transmission lines and roads.
Human presence and activity	Site characterization, construction, operations, decommissioning	Behavioral disturbance, harassment, nest abandonment, avoidance of areas, territory adjustments, reduction in carrying capacity.	All plants	Invertebrates, fish	Amphibians, reptiles, small mammals	Birds, large mammals	Can be reduced during site characterization and construction by timing activities to avoid sensitive periods. Difficult to reduce impacts during operations.
Increased human access	Construction, operations	Harassment, collection, increased predation risk, increased collision mortality risk.	None	Plants	Animals	None	Can be reduced by reducing the number of new transmission lines and roads in important habitats.

TABLE 5-1 (Cont.)

Impacting Factor	Project Phase	Consequence	Potential Relative Impact[a] for Different Species Groups[b]				Ability to Reduce Impacts[c]
			None	Small	Moderate	Large	
Individual Impacting Factor[d] (Cont.)							
Oil and contaminant spills	Site characterization, construction, operations, decommissioning	Death of directly affected individuals, uptake of toxic materials, reproductive impairment, reduction in carrying capacity.	None	None	Terrestrial plants and animals	Aquatic, wetland, and riparian plants and animals	Can be reduced by using best management practices (e.g., pipeline check valves) and spill prevention and response planning.
Project infrastructures	Operations	Increased predation rates from predators using tall structures, collision mortality.	All plants, large mammals	Invertebrates, amphibians	Reptiles, birds, and small mammals	None	Can be reduced by using appropriate warning lights on towers, markers on lines, and guy wires, or elimination of guy wires.
Restoration of topography and drainage patterns	Decommissioning	Beneficial changes in temperature, soil moisture, and hydrologic regimes.	None	None	All plants and animals	None	Mostly beneficial; adverse impacts can be reduced by using standard erosion and runoff control measures.
Restoration of topsoil	Decommissioning	Beneficial changes in soil moisture, increased productivity and carrying capacity.	None	None	All plants and animals	None	Mostly beneficial; adverse impacts can be reduced by using standard erosion and runoff control measures.
Restoration of native vegetation	Decommissioning	Beneficial changes in soil moisture, increased productivity and carrying capacity, increased diversity.	None	None	All plants and animals	None	Mostly beneficial; adverse impacts can be reduced by ensuring species mix used includes a diverse weed-free mix of hardy native species.

TABLE 5-1 (Cont.)

Impacting Factor	Project Phase	Consequence	Potential Relative Impact[a] for Different Species Groups[b]				Ability to Reduce Impacts[c]
			None	Small	Moderate	Large	
Individual Impacting Factor[d] (Cont.)							
Site lighting	Construction, operations	Behavioral disturbance, harassment, nest abandonment, avoidance of areas, territory adjustments, reduction in carrying capacity, collision with structures.	All plants	Fish, invertebrates, amphibians, and reptiles	Birds and mammals	None	Easily reduced by ensuring lighting is minimized to that needed for safe construction and operations and does not project past site boundaries.
Soil compaction	Site characterization, construction, operations, decommissioning	Reduction in productivity, reduction in diversity, reduction in carrying capacity, increased runoff and erosion, spread of invasive species.	None	All plants and animals	None	None	Easily reduced by aerating soil after being compacted.
Topsoil removal	Construction, operations	Reduction in productivity, reduction in diversity, reduction in carrying capacity, direct mortality of individuals, increased sedimentation in aquatic habitat, spread of invasive species.	None	None	All plants and animals	None	Readily reduced by stockpiling soils to maintain seed viability, vegetating to reduce erosion, and replacing at appropriate depths when other site activities are complete.
Vegetation clearing	Construction, operations	Habitat loss, habitat fragmentation, direct mortality of individuals, changes in temperature and moisture regimes, erosion, increased fugitive dust emissions, reduction in productivity, reduction in diversity, reduction in carrying capacity, spread of invasive species.	None	None	None	All plants and animals	Difficult to reduce; most project areas are likely to require clearing. Restoration of a vegetative cover consistent with the intended land use would reduce some impacts.

TABLE 5-1 (Cont.)

Impacting Factor	Project Phase	Consequence	Potential Relative Impact[a] for Different Species Groups[b]				Ability to Reduce Impacts[c]
			None	Small	Moderate	Large	
Individual Impacting Factor[d] (Cont.)							
Vegetation maintenance	Operations	Reduction in vegetation cover or vegetation maintained in early successional stage or low-stature, habitat fragmentation, direct mortality of individuals, reduction in diversity, reduction in carrying capacity, spread of invasive species.	None	Fish	Plants and animals (other than fish)	None	Can be reduced by managing for low-maintenance vegetation (e.g., native shrubs, grasses, and forbs), controlling invasive species, minimizing the use of herbicides near sensitive habitats (e.g., aquatic and wetland habitats), and using only approved herbicides consistent with safe application guidelines.
Vehicle and equipment emissions	Construction, operations	Reduced productivity.	None	All plants and animals	None	None	Readily reduced by maintaining equipment in proper operating condition.
Vehicle and foot traffic	Site characterization, construction, operations, decommissioning	Direct mortality of individuals through collision or crushing, soil compaction, increased fugitive dust emissions.	None	Aquatic and wetland animals, all plants, all invertebrates.	Terrestrial amphibians, reptiles, birds, mammals	None	Can be reduced by using worker education programs, signage, and traffic restrictions.

TABLE 5-1 (Cont.)

Impacting Factor	Project Phase	Consequence	Potential Relative Impact[a] for Different Species Groups[b]				Ability to Reduce Impacts[c]
			None	Small	Moderate	Large	
All Impacting Factors Combined							
	Site characterization	Direct mortality of individuals, habitat loss, behavioral disturbance, soil compaction, increased fugitive dust emissions, increased runoff and erosion, spread of invasive species.	None	All plants and animals	None	None	Relatively easy.
	Construction	Direct mortality of individuals, habitat loss, behavioral disturbance, reduced productivity and diversity, reduced carrying capacity, habitat fragmentation, soil compaction, increased fugitive dust emissions, spread of invasive species, changes in temperature and moisture regimes, increased sedimentation in aquatic habitat, increased runoff and erosion, changes in groundwater recharge.	None	None	None	All plants and animals	Relatively difficult; residual impact mostly dependent on the size of area developed.

TABLE 5-1 (Cont.)

Impacting Factor	Project Phase	Consequence	Potential Relative Impact[a] for Different Species Groups[b]				Ability to Reduce Impacts[c]
			None	Small	Moderate	Large	
All Impacting Factors Combined (Cont.)							
	Operations	Direct mortality of individuals, habitat loss, behavioral disturbance, reduction in vegetation cover or vegetation maintained in early successional stage or low-stature, reduced productivity and diversity, reduced carrying capacity, habitat fragmentation, soil compaction, increased fugitive dust emissions, changes in temperature and moisture regimes, increased sedimentation in aquatic habitat, increased runoff and erosion, changes in groundwater recharge.	None	None	None	All plants and animals	Relatively difficult; residual impact mostly dependent on the size of area developed.
	Decommissioning	Beneficial changes in soil moisture, temperature, and hydrologic regimes, increased productivity and carrying capacity, increased diversity, direct mortality of individuals, habitat loss, behavioral disturbance, soil compaction, increased fugitive dust emissions.	None	None	All plants and animals (benefits)	None	Relatively easy to reduce adverse impacts of decommissioning. May be difficult to achieve restoration objectives.

TABLE 5-1 (Cont.)

Impacting Factor	Project Phase	Consequence	Potential Relative Impact[a] for Different Species Groups[b]				Ability to Reduce Impacts[c]
			None	Small	Moderate	Large	
All Impacting Factors Combined (Cont.)							
	Overall project	Direct mortality of individuals, habitat loss, behavioral disturbance, reduced productivity and diversity, reduced carrying capacity, habitat fragmentation, soil compaction, increased fugitive dust emissions, changes in temperature and moisture regimes, increased sedimentation in aquatic habitat, increased runoff and erosion, changes in groundwater recharge.	None	None	None	All plants and animals	Relatively difficult; residual impact mostly dependent on the size of area developed and the success of restoration activities.

[a] Potential impact magnitude categories were developed by using Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1508.27) by defining the significance of impacts based on context and intensity. Similar impact magnitude categories and definitions were used in the *National Environmental Policy Act Handbook H-1790-1* (BLM 2008b) and the *BLM Wind Energy Program Policies and Best Management Practices* (BLM 2008c) and assume no avoidance, minimization, or other mitigation. Impact categories were as follows: (1) *none*—no impact would occur; (2) *small*—effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource (e.g., <1% of the population or its habitat would be lost in the region); (3) *moderate*—effects are sufficient to alter noticeably but not to destabilize important attributes of the resource (e.g., >1 but <10% of the population or its habitat would be lost in the region); and (4) *large*—effects are clearly noticeable and are sufficient to destabilize important attributes of the resource (e.g., >10% of a population or its habitat would be lost in the region). Actual magnitudes of impacts would depend on the location of projects, project-specific design, application of design features, and the status of species and their habitats in project areas.

[b] Listed species are placed into groups based on taxonomy (plants, invertebrates, amphibians, reptiles, birds, and mammals). Other categories such as ecological system (aquatic, wetland, riparian, and terrestrial) or size (e.g., small and large mammals) are used when the category is relevant to impact magnitude.

[c] Actual ability to reduce impacts will depend on site-specific conditions and the species present in the project area. Required design features that would reduce impacts are presented in Section 2.2.

[d] Impacting factors are presented in alphabetical order.

1

5.1.1.1 Site Characterization

Most characterization activities (e.g., surface hydrology and floodplain mapping) involve minimum or no site disturbance and are unlikely to affect listed species. However, some characterization activities may require ground disturbances that might affect local plants and wildlife species. Some of these activities include the installation of groundwater monitoring wells (for those projects that anticipate the use of groundwater) or the construction of meteorological towers to obtain climatic data for projects in remote areas. In addition, increased human presence in the area may affect local populations of plants and animals through collection, inadvertent or unintentional harassment, or both.

5.1.1.2 Construction

For the analysis, it was assumed that the project area would be graded and all vegetation removed. Plants and animals close to the project area could be affected by runoff from the site due to erosion or sedimentation. In addition, fugitive dust, vehicle emission particulates, and other contaminants (e.g., fuel, oil) may accumulate in areas near the project area, which may be absorbed by plant leaf surfaces and roots. Such processes can reduce photosynthesis and metabolism rates in plants and subsequently affect plant vigor. Disturbed areas within and near the project area could be colonized by exotic invasive plant species. Invasive plant species are generally more tolerant of disturbed conditions, and their establishment within and surrounding the project area could be facilitated by the level of disturbance associated with project activities. Further, invasive plant species, if left unchecked, can develop high population densities, which can exclude the re-establishment of native species for long periods. This may especially affect special status plant species that occur in small populations.

Larger, more mobile animals, such as birds and medium-sized or large mammals, would be most likely to leave the project area during site preparation and construction activities. Development of the site would represent a loss of habitat for these species and potentially a reduction in carrying capacity (i.e., the number of individuals of a species that can be supported in an area). Smaller animals, such as small mammals, tortoises, lizards, snakes, and amphibians, are more likely to be killed during clearing and construction activities. If land-clearing and construction activities occur during the spring and summer, bird nests and nestlings in the project area could be destroyed. Longer term impacts, such as increased vulnerability to predators and diseases, could occur as a result of habitat destruction during the construction phase and may continue to affect listed plants and animals beyond the life of the project.

5.1.1.3 Operations

Throughout the operational period, the site would have reduced plant cover, and the entire site would be fenced. This would represent a direct loss of habitat and productivity on the site, as well as create a barrier to most wildlife movements. Further, during operations, the developed site could lead to fragmentation of otherwise intact habitat and, in some cases, isolation of the remaining suitable habitat patches from one another. Such habitat fragmentation

can have negative effects on some species by increasing the amount of edge habitat, thus making individuals more vulnerable to predation, diseases, and human collection and/or harassment. Listed animal species in and adjacent to project areas could be disturbed by human activities and would tend to avoid the area while activities were occurring. Site lighting, reflectivity, and operational noise from equipment could affect animals on and off the site, resulting in avoidance or reduction in use of an area larger than the project footprint. Runoff from the site during site operations could result in erosion and sedimentation of adjacent habitats. Fugitive dust during operations could affect adjacent plant populations and result in reduced productivity. Long-term changes in surface water or groundwater quality associated with site operations could affect local plant and animal populations. Groundwater withdrawals to support construction and operational needs could result in drawdown of aquifers and subsequent reductions in stream and other surface water levels. These reductions could reduce base flows, reduce aquatic habitat availability and quality, and affect wetlands and riparian habitats dependent on those water levels.

5.1.1.4 Decommissioning and Reclamation

In general, the impacts on listed plant and animal species associated with decommissioning of utility-scale solar energy facilities would be short term and similar to those associated with facility construction. For the most part, decommissioning activities would occur only in areas previously disturbed by project construction activities and operations, although adjacent areas could be affected. Decommissioning would likely include soil disturbances to remove aboveground and belowground structures. During decommissioning, fugitive dust and other particulates may be spread to adjacent areas and adversely affect plant species. Increased human presence, traffic, and noise associated with decommissioning activities may also affect listed animal species through human collection, altered behavioral patterns, or mortality (e.g., vehicle collisions).

Decommissioning activities would include reclamation efforts. During this phase, the site would be regraded if needed and revegetated with native species in attempts to restore the site to pre-disturbance conditions. Other reclamation activities may include re-establishing natural drainage and hydrological processes and limiting human access to the site. Although reclamation efforts may increase habitat availability and quality from project operation conditions, it may take many years, or it may not be possible for the project site to be fully restored to pre-disturbance conditions.

5.1.1.5 Transmission Lines and Access Roads

The impacts on listed species from the construction of new transmission lines and new access roads, maintenance of transmission line ROWs, and upgrades to existing lines and access roads associated with utility-scale solar energy projects would be similar to those from other activities presented in Table 5-1. Potential construction impacts would result primarily from ground disturbance, vegetation removal, and excavation during clearing of the ROWs, construction of access roads and structures (e.g., transmission line towers, substations, or

pipelines), and increased mortality risks from vehicle collisions. Activities include the clearing of land for the establishment of transmission line ROWs, construction of transmission facilities and related infrastructure, and maintenance of ROWs. Impacts on listed species resulting from transmission line and access road construction, operation, and maintenance could include the following:

- Habitat destruction or degradation resulting from clearing of ROWs, construction, altered topography, altered hydrologic patterns, soil removal and/or erosion, sedimentation, fugitive dust, contaminant spills, and the spread of invasive species.

- Habitat and population fragmentation resulting from the establishment of transmission line ROWs and access roads through intact patches of habitat, thereby preventing the movement of organisms throughout the population area. Note that this impact is most likely only in those habitats that would require vegetation clearing and management (e.g., forest). In most parts of the arid West, little if any clearing may be necessary and habitat fragmentation would not be a concern.

- Disturbance and harassment of animals from noise and human activities during construction, ROW maintenance, and operations. Disturbances that occur during the breeding season would have the greatest adverse impacts and could result in animals abandoning traditional breeding grounds and nest sites.

- Mortality from vehicle and transmission infrastructure collisions during construction, operations, and decommissioning.

- Increased predation of listed species resulting from the increase in localized predator populations. Such predators (e.g., raccoons, skunks) are attracted to habitat edges established by transmission line corridors and access roads.

- Aquatic species may be affected by increases in water temperature in areas crossed by transmission facilities resulting from the removal of riparian vegetation that would otherwise shade surface water.

- Plant species may be affected by the spread of invasive exotic species in or near areas that have been disturbed by activities associated with transmission line and access road construction, maintenance, or both. Invasive plant species generally possess characteristics that allow them to thrive in disturbed habitats, thereby displacing native plant species and limiting their ability to compete for sunlight and soil nutrients.

5.1.2 Technology-Specific Impacts

This section discusses the potential impacts on federally listed, proposed, and candidate species associated with specific technologies for utility-scale solar energy development. These impacts are based on the activities anticipated to occur at sites utilizing currently established technologies. The estimated land area and water demands vary among facilities using different technologies.

Maximum estimated land area requirements are greatest for facilities utilizing dish engine and photovoltaic (PV) technologies (6,750 acres [27 km^2] each). Facilities utilizing parabolic trough and power tower technologies would require an estimated maximum land area of 2,000 acres (8 km^2) and 3,600 acres (15 km^2), respectively.

Withdrawals from groundwater or surface water sources may alter hydrological regimes and affect local plant and animal species. Habitat for aquatic and semiaquatic species may be lost or degraded. Hydrological dynamics within wetland and riparian areas may also be affected, thereby potentially affecting the aquatic and terrestrial plant and animal species that utilize these resources. Parabolic trough and power tower technologies require cooling systems; therefore, facilities utilizing these technologies would require greater amounts of water (maximum 6,400 ac-ft/yr [7.8 million m^3/yr]). Dish engine and PV technologies do not require cooling systems. Because of this, dish engine and PV facilities would require less water; water would be needed only for cleaning, dust control, and potable water needs (maximum 375 ac-ft/yr [0.5 million m^3/yr]).

Parabolic trough facilities and power tower facilities use heat transfer fluids (HTFs) (e.g., synthetic oils, molten salt) to store and transfer energy. Dish engine facilities utilize solar insolation to expand gas and generate mechanical energy, which is later converted to electricity. PV facilities utilize solar cells (and associated semiconductors) to convert solar energy to electricity. The accidental release of HTFs (in parabolic trough and power tower technologies) may result in leaching of materials into groundwater or runoff into nearby habitats where plants and aquatic resources may be affected. Wildlife that drink or consume contaminated water or plants may also be affected depending on the concentrations and toxicity of released materials. Noise levels associated with dish engines may also affect local wildlife by deterring their movements and reducing the area's overall carrying capacity. PV projects would not have impacts associated with spills or noise.

5.2 EFFECT DETERMINATIONS FOR SPECIES THAT COULD OCCUR IN AFFECTED AREAS OF SEZS

This section presents the effect determinations for those species that could occur within the affected areas of one or more of the 17 SEZs. General information on each species, the direct and indirect effects of solar energy development in the SEZs, and species-specific avoidance and minimization measures, including required design features (Section 2.2), are presented. The effect determinations are based on the implementation of all required design features and species-specific avoidance and minimization measures.

A summary of effect determinations for all species is provided in Table 5-2.

A total of 21 species that are listed as threatened or endangered under the ESA could occur in areas affected by solar energy development on the SEZs (Table 5-2). Of these species, 11 are listed as endangered and 10 are listed as threatened. Many of these species are groundwater-dependent species that may occur more than 5 mi (8 km) away from the nearest SEZ. Each of these species is discussed below.

5.2.1 Plants

5.2.1.1 Sneed's Pincushion Cactus

The Sneed's pincushion cactus was federally listed as endangered on November 7, 1979 (USFWS 1979). Critical habitat has not been designated. Historically, the Sneed's pincushion cactus was known only from the Anthony Gap area of the Franklin Mountains in Doña Ana County, New Mexico. It is currently known from most of the Franklin Mountains of El Paso County, Texas, and Doña Ana County, New Mexico. It also occurs at the southern end of the Organ Mountains of New Mexico and in the Guadalupe Mountains of Texas and New Mexico. At the time the species recovery plan was written (USFWS 1986a), there were 20 known localities for this species on federal and private land.

The Sneed pincushion cactus is restricted to limestone substrates on terraces, ridgetops, hillsides, and ledges in the high Chihuahuan Desert of the Franklin, Guadalupe, and Organ Mountains of Texas and New Mexico. Plants occur primarily in cracks in the limestone substrate or in shallow pockets of loamy soil on hillsides and ridgetops between 3,900 and 7,700 ft (1,190 and 2,345 m) in elevation. The subspecies typically occurs in semidesert grasslands or woodlands in an agave-juniper association. In the Guadalupe Mountains, it extends upward in elevation to the lower pinyon-juniper woodland. It usually occurs in sparsely vegetated areas with shrubby species, but it is rarely under cover. Associated plant species include lechuguilla (*Agave lechuguilla*), sideoats grama (*Bouteloua curtipendula*), whitecolumn foxtail cactus (*Escobaria albicolumnaria)*, Mormon tea (*Ephedra trifurca*), Apache plume (*Fallugia paradoxa*), Pinchot's juniper (*Juniperus pinchotii*), Texas sacahuista (*Nolina texana*), and cactus apple (*Opuntia engelmannii*).

The Sneed's pincushion cactus is a long-lived, succulent, perennial species. Reproduction is sexual; although plants can be propagated vegetatively for cutting, they have no natural mechanism for doing so. Sneed cactus plants likely germinate from late May to early June but do not begin blooming until after they have attained 3 to 4 years of age. The plants bud in March and April, flower in mid to late April, and fruit from August to November.

This subspecies is threatened by illegal collecting and habitat destruction. Plants are relatively tough, not being affected by many of the fungi and insect predators that adversely affect other cacti.

TABLE 5-2 Effect Determinations for Federally Listed Species That May Occur in the Affected Areas of the SEZs

Common Name	Scientific Name	Status	SEZs and Associated Affected Areas Where Species Could Occur: SEZ	Access Road ROW	Indirect Effects Area	Effect Determination
Plants						
Amargosa niterwort	*Nitrophila mohavensis*	Endangered	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Ash Meadows blazing-star	*Mentzelia leucophylla*	Threatened	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Ash Meadows gumplant	*Grindelia fraxinopratensis*	Threatened	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Ash Meadows ivesia	*Ivesia eremica*	Threatened	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Ash Meadows milkvetch	*Astragalus phoenix*	Threatened	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Ash Meadows sunray	*Enceliopsis nudicaulis* var. *corrugata*	Threatened	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Sneed's pincushion cactus	*Escobaria sneedii* var. *sneedii*	Endangered	None	None	Afton	No effect
Spring-loving centaury	*Centaurium namophilum*	Threatened	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Invertebrates						
Ash Meadows naucorid	*Ambrysus amargosus*	Threatened	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect

TABLE 5-2 (Cont.)

Common Name	Scientific Name	Status	SEZs and Associated Affected Areas Where Species Could Occur: SEZ	Access Road ROW	Indirect Effects Area	Effect Determination
Fish						
Ash Meadows Amargosa pupfish	*Cyprinodon nevadensis mionectes*	Endangered	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Ash Meadows speckled dace	*Rhinichthys osculus nevadensis*	Endangered	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Devils Hole pupfish	*Cyprinodon diabolis*	Endangered	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect
Hiko White River springfish	*Crenichthys baileyi grandis*	Endangered	None	None	Dry Lake Valley North (groundwater only)	May affect, likely to adversely affect
Moapa dace	*Moapa coriacea*	Endangered	None	None	Dry Lake (groundwater only)	May affect, likely to adversely affect
Pahranagat roundtail chub	*Gila robusta jordani*	Endangered	None	None	Dry Lake Valley North (groundwater only)	May affect, likely to adversely affect
Pahrump poolfish	*Empetrichthys latos*	Endangered	None	None	Dry Lake (groundwater only)	May affect, not likely to adversely affect
Warm Springs pupfish	*Cyprinodon nevadensis pectoralis*	Endangered	None	None	Amargosa Valley (groundwater only)	May affect, likely to adversely affect

TABLE 5-2 (Cont.)

Common Name	Scientific Name	Status	SEZs and Associated Affected Areas Where Species Could Occur: SEZ	Access Road ROW	Indirect Effects Area	Effect Determination
Fish (Cont.)						
White River springfish	*Crenichthys baileyi baileyi*	Endangered	None	None	Dry Lake Valley North (groundwater only)	May affect, likely to adversely affect
Reptiles						
Desert tortoise (Mojave population)	*Gopherus agassizii*	Threatened	Amargosa Valley, Dry Lake, Riverside East	Dry Lake Valley North	Amargosa Valley, Dry Lake, Dry Lake Valley North, Riverside East	May affect, likely to adversely affect (Amargosa Valley, Dry Lake, and Riverside East) May affect, not likely to adversely affect (Dry Lake Valley North)
Birds						
Mexican spotted owl	*Strix occidentatlis lucida*	Threatened	None	Los Mogotes East	Antonito Southeast, Los Mogotes East	May affect, not likely to adversely affect
Northern aplomado falcon	*Falco femoralis septentrionalis*	Experimental, nonessential population	None	None	Afton	May affect, not likely to adversely affect

TABLE 5-2 (Cont.)

Common Name	Scientific Name	Status	SEZs and Associated Affected Areas Where Species Could Occur: SEZ	Access Road ROW	Indirect Effects Area	Effect Determination
Birds (Cont.)						
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	None	Antonito Southeast, Gillespie	Antonito Southeast, De Tilla Gulch, Dry Lake, Fourmile East, Gillespie, Los Mogotes East	May affect, not likely to adversely affect (Antonito Southeast, De Tilla Gulch, Dry Lake, Fourmile East, Gillespie, and Los Mogotes East)
Yuma clapper rail	*Rallus longirostris yumanensis*	Endangered	Imperial East	Gillespie	Gillespie, Imperial East	May affect, not likely to adversely affect (Gillespie and Imperial East)
Mammals						
Utah prairie dog	*Cynomys parvidens*	Threatened	Escalante Valley, Milford Flats South, Wah Wah Valley	Escalante Valley, Milford Flats South, Wah Wah Valley	Escalante Valley, Milford Flats South, Wah Wah Valley	May affect, not likely to adversely affect (Escalante Valley, Milford Flats South, and Wah Wah Valley)

Given the known distribution of this species, the Sneed's pincushion cactus may be found near the Afton SEZ. Occurrences of this species have been recorded approximately 10 mi (16 km) and 32 mi (51 km) southeast of the Afton SEZ. SWReGAP land cover types that occur in the area of this SEZ that may represent potentially suitable habitat include Warm Desert Bedrock Cliff and Outcrop (S016) (USGS 2004, 2005). SWReGAP data show this land cover type within the SEZ and the area of indirect effects for the Afton SEZ (Figure 5-1). However, field surveys have indicated that no suitable habitat for this species occurs on the Afton SEZ or in the area of direct effects. Given the species' restricted geographic distribution, it is also unlikely that the species could occur in the area of indirect effects outside of the SEZ.

Direct and Indirect Effects of Development on SEZs

Table 5-1 presents the potential impacts on plants that could result from the construction, operation, and decommissioning of utility-scale solar energy facilities, including associated access road corridors. The Sneed's pincushion cactus is unlikely to occur within the boundary of the SEZ based on the current understanding of the species' restricted geographic distribution and affinity for limestone outcrops in Chihuahuan Desert grassland communities. However, potentially suitable habitat for this species may occur outside the Afton SEZ in the area of indirect effects. It is unlikely that solar energy development and construction of ancillary facilities will occur in sloped areas or unique habitats that may represent suitable habitat for this species, such as limestone cliffs and outcrops.

Design Features and Applicable Avoidance and Minimization Measures

As stated above, it is considered unlikely that the Sneed's pincushion cactus would be found on the Afton SEZ, assumed access road corridor, or in the area of potential indirect effects outside of the boundaries of the SEZ. Any necessary future transmission ROW developments or upgrades to serve solar energy development on the SEZ would not likely occur in suitable habitat for this species. Programmatic design features that would be required of all solar energy projects to reduce ecological impacts under the proposed program are listed in Section 2.2. These measures will limit potential adverse effects on the Sneed's pincushion cactus.

For solar energy development within the Afton SEZ, required design features that would reduce the potential for impact on the Sneed's pincushion cactus would focus on limiting the potential for indirect impacts in areas adjacent to the SEZ. Pre-disturbance coordination with the Service would be conducted to determine the potential for the Sneed's pincushion cactus to occur in the vicinity of the proposed project. If the Service determines that the species may be indirectly affected by development, solar facilities would be constructed at an appropriate setback distance within the SEZ, or other actions necessary to reduce the potential for indirect effects would be taken. Development upslope of any nearby populations would be prohibited to prevent site runoff from affecting known populations.

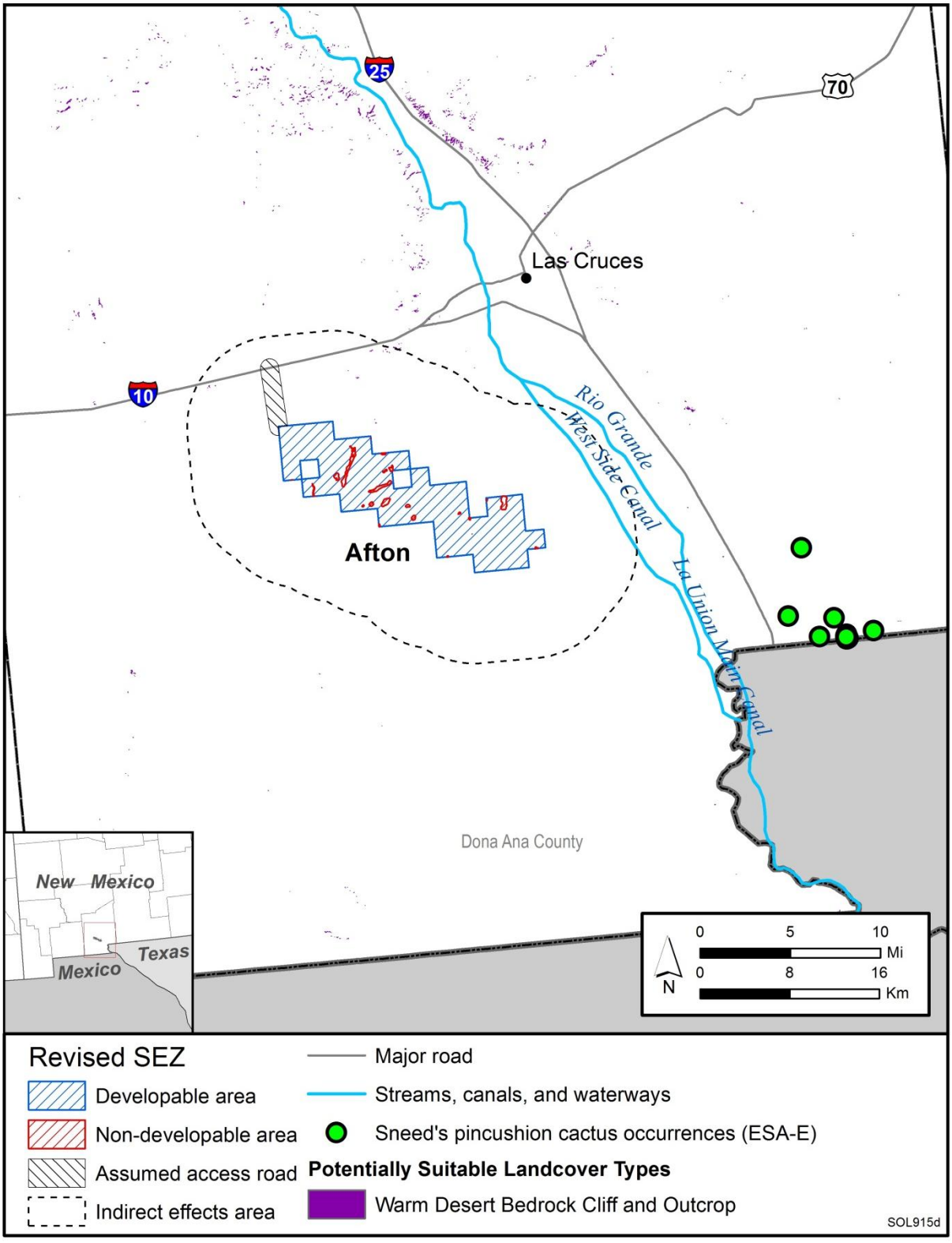

FIGURE 5-1 Known Occurrences and Availability of Potentially Suitable Habitat for the Sneed's Pincushion Cactus in the Affected Area of the Proposed Afton SEZ (Sources: Hewitt 2009; USGS 2004)

Effect Determination

With the implementation of all required design features and species-specific avoidance and minimization measures identified above and in Section 2.2, solar energy development on the Afton SEZ would have no effect on the Sneed's pincushion cactus. Solar energy development on other SEZs would not affect this species.

5.2.2 Reptiles

5.2.2.1 Desert Tortoise (Mojave Population)

The Mojave population of the desert tortoise occurs in desert regions of the southwestern United States and northwestern Mexico, north and west of the Colorado River. The Sonoran population of the desert tortoise occurs south and east of the Colorado River. Within the action area, the Mojave desert tortoise occurs in portions of California, Nevada, and Utah. The Mojave population of desert tortoise was federally listed as threatened on August 20, 1980 (USFWS 1980). On February 8, 1994, the Service designated approximately 6.4 million acres (25,900 km^2) of desert in the states of California, Nevada, and Utah as critical habitat for this species (USFWS 1994). The Mojave population was listed in response to precipitous declines in desert tortoise numbers in many areas. The Sonoran desert tortoise is currently a candidate species for listing under the ESA.

Within the varied plant communities of the Mojave and Sonoran Desert regions, desert tortoises can potentially survive and reproduce where their basic habitat requirements are met. These requirements include sufficient suitable plants for forage and cover and suitable substrates for burrow and nest sites. Desert tortoises occur primarily on flats and bajadas that have soils ranging from sand to sandy-gravel and that are characterized by scattered shrubs and abundant inter-shrub space for growth of herbaceous plants. Desert tortoises are also found on rocky terrain and slopes in parts of the Mojave and Sonoran Desert regions. There is substantial geographic variation in the way tortoises use available resources. Desert tortoises spend much of their lives in burrows, emerging to feed and mate during late winter and early spring. They typically remain active through the spring, and they sometimes emerge again after summer storms. During these activity periods, desert tortoises eat a wide variety of herbaceous plants, particularly grasses and the flowers of annual plants. Desert tortoises exhibit delayed maturity and live a long life. Females typically create a nest under a large shrub or at a burrow entrance and lay from 2 to 14 eggs from May to July (UDWR 2010). Adults are well protected against most predators (apart from humans) and other environmental hazards. During hibernation, several individuals often occupy the same burrow. Their longevity helps compensate for their variable annual reproductive success, which is correlated with environmental conditions (USFWS 2008; NatureServe 2010; UDWR 2010).

Several factors have led to declining populations of the desert tortoise. Reductions in tortoise numbers have been attributed to direct and indirect human-caused mortality, coupled with the inadequacy of existing regulatory mechanisms to protect desert tortoises and their

habitat. Impacts, such as the destruction, degradation, and fragmentation of habitat, result from urbanization, agricultural development, livestock grazing, mining, and roads. An upper respiratory tract disease is an additional major cause of mortality and population decline, particularly in the western Mojave Desert. Predators that prey on adult desert tortoises include the coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), raccoon (*Procyon lotor*), bobcat (*Felis rufus*), badger (*Taxidea taxus),* and feral dog (*Canis familiaris*). Predators of tortoise eggs and young include the common raven (*Corvus corax*), Gila monster (*Heloderma suspectum*), snakes, roadrunner (*Geococcyx californianus*), red-tailed hawk (*Buteo jamaicensis*), and badger (USFWS 2008; NatureServe 2010).

On the basis of recorded observations and the presence of potentially suitable habitat, the Mojave desert tortoise may occur in the affected area of four SEZs in the states of California and Nevada (Table 5-2): California—Riverside East; Nevada—Amargosa Valley, Dry Lake, and Dry Lake Valley North.

Solar Energy Zones in Which the Species May Occur

Riverside East. The Service determined that the desert tortoise has the potential to be affected by solar energy development on the Riverside East SEZ (Stout 2009). According to California Natural Diversity Database (CNDDB) records, this species is known to occur in the western portion of the Riverside East SEZ (Figure 5-2). The tortoise is known to occur in Joshua Tree NP (west of the SEZ) and the Pinto Mountains and Chuckwalla Desert Wildlife Management Areas (DWMAs). Joshua Tree NP is west of the SEZ; the Pinto Mountains DWMA is northwest of the SEZ; and the Chuckwalla DWMA is south of the SEZ. The Pinto Mountains and Chuckwalla DWMAs are designated critical habitats for the Mojave desert tortoise. The Chuckwalla DWMA and Joshua Tree NP are within the area of indirect effects adjacent to the southern and western boundary of the SEZ, respectively. According to the CAReGAP habitat suitability model, approximately 143,600 acres (581 km^2) of potentially suitable habitat for the desert tortoise occurs in the area of direct effects within the Riverside East SEZ. The USGS desert tortoise model (Nussear et al. 2009) indicates that the majority of the SEZ is composed of less suitable habitat than the surrounding landscape (modeled suitability value greater than or equal to 0.5 out of 1.0). About 441,400 acres (1,785 km^2) of suitable habitat occurs in the area of indirect effects (Figure 5-2).

On the basis of surveys conducted in Joshua Tree NP, adjacent to the western border of the SEZ, the Service estimated that the SEZ may support up to 2,865 desert tortoises (Stout 2009). Although designated critical habitat does not occur within the SEZ, portions of the Joshua Tree NP and Chuckwalla DWMA occur in the area of indirect effects within 5 mi (8 km) of the Riverside East SEZ.

Amargosa Valley. The desert tortoise is known to occur throughout the affected area of the Amargosa Valley SEZ. According to the Service (Stout 2009), specific information on the density of tortoises in the vicinity of the Amargosa Valley SEZ is currently not available. However, tortoises have been observed along U.S. 95, which intersects the northeast boundary of

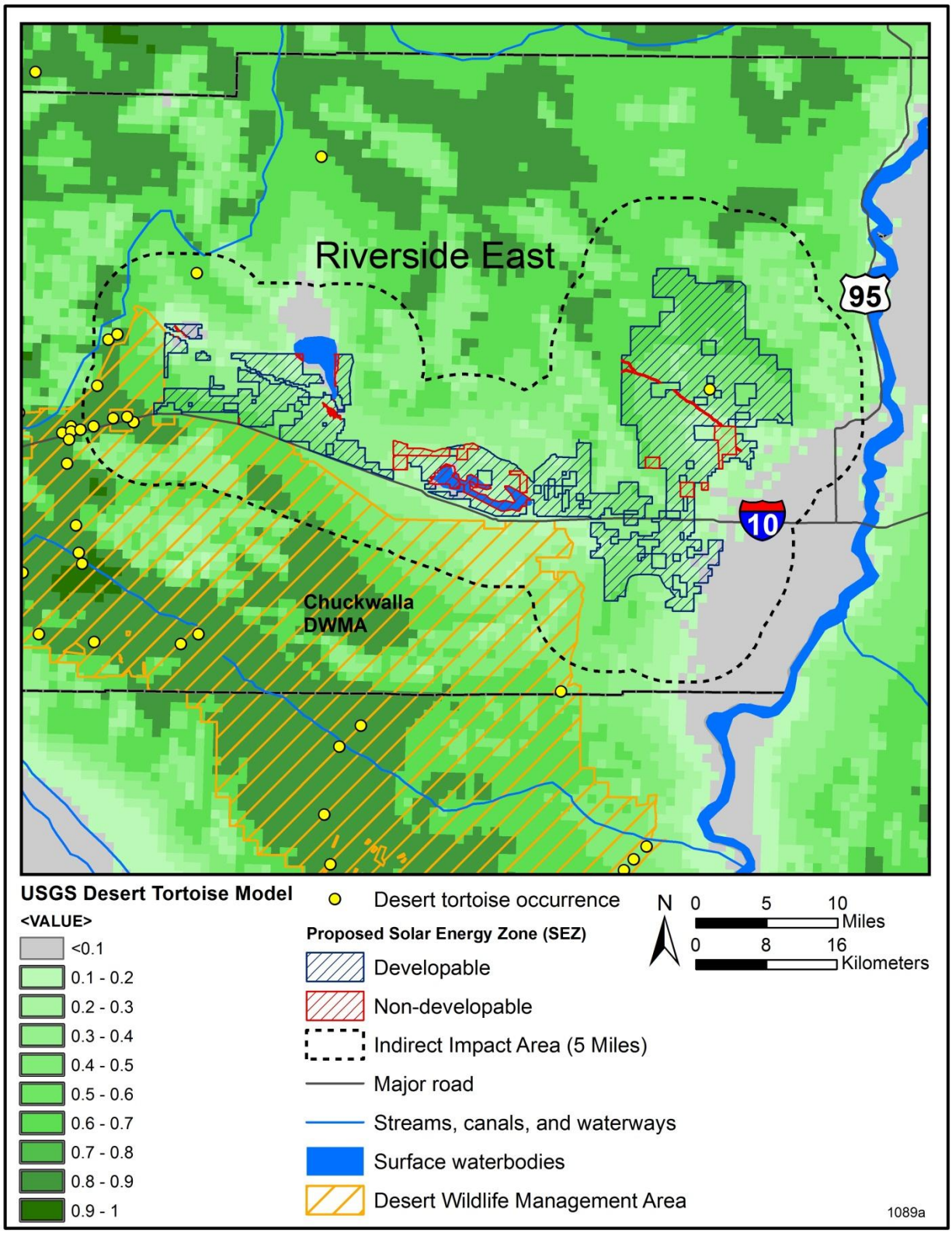

FIGURE 5-2 Known Occurrences and Availability of Potentially Suitable Habitat for the Mojave Desert Tortoise in the Affected Areas of the Proposed Riverside East SEZ (Sources: CDFG 2010a; Nussear et al. 2009)

the SEZ; tortoises have also been observed within the SEZ and throughout the area of indirect effects east and west of the SEZ (Figure 5-3). According to the SWReGAP habitat suitability model, approximately 8,470 acres (34 km^2) of potentially suitable habitat occurs in the area of direct effects within the SEZ. Much of this habitat within the SEZ is considered to be highly suitable (modeled suitability value greater than or equal to 0.5 out of 1.0) according to the USGS desert tortoise habitat suitability model (Nussear et al. 2009). About 92,000 acres (372 km^2) of suitable habitat occurs in the area of potential indirect effects (Figure 5-3). Designated critical habitat for the Mojave desert tortoise does not occur in the vicinity of the Amargosa Valley SEZ.

Dry Lake. The desert tortoise is known to occur on the Dry Lake SEZ and throughout the affected area of the SEZ. According to the Service (Stout 2009), desert tortoise populations have the potential to occur on the Dry Lake SEZ, and designated critical habitat for this species occurs in the Mormon Mesa critical habitat unit west of the SEZ (Figure 5-3). According to the SWReGAP habitat suitability model, approximately 5,665 acres (23 km^2) of potentially suitable habitat for this species occurs in the area of direct effects within the SEZ. The USGS desert tortoise model (Nussear et al. 2009) identifies the SEZ as having overall high habitat suitability for desert tortoise (suitability score greater than or equal to 0.5 out of 1.0). About 70,250 acres (284 km^2) of potentially suitable habitat occurs in the area of indirect effects.

On the basis of surveys conducted in Mormon Mesa critical habitat unit, adjacent to the western border of the SEZ, the Service estimated that the SEZ may support up to 213 desert tortoises (Stout 2009). Although designated critical habitat does not occur within the SEZ, portions of the Mormon Mesa critical habitat unit occur in the area of indirect effects within 5 mi (8 km) west of the Dry Lake SEZ (Figure 5-3).

Dry Lake Valley North. The desert tortoise is known to occur as near as 30 mi (48 km) southwest of the Dry Lake Valley North SEZ. Although the Service determined that the species is not likely to occur on the SEZ because of the lack of suitable habitat (Stout 2009), the species may still occur in the affected area outside the SEZ. Potentially suitable habitat for the desert tortoise is not expected to occur in the area of direct effects within the SEZ; however, potentially suitable habitat may occur in the area of direct effects within the assumed access road corridor and also within the area of indirect effects within 5 mi (8 km) south of the SEZ. According to the SWReGAP habitat suitability model, approximately 540 acres (2 km^2) of potentially suitable habitat occurs in the area of direct effects within the access road corridor. The USGS desert tortoise habitat suitability model (Nussear et al. 2009) indicates low habitat suitability throughout the entire SEZ affected area (modeled suitability value greater than or equal to 0.3 out of 1.0 throughout the affected area). About 1,150 acres (5 km^2) of potentially suitable habitat for this species occurs in the area of indirect effects (Figure 5-4). Designated critical habitat for the desert tortoise does not occur in the vicinity of the Dry Lake Valley North SEZ.

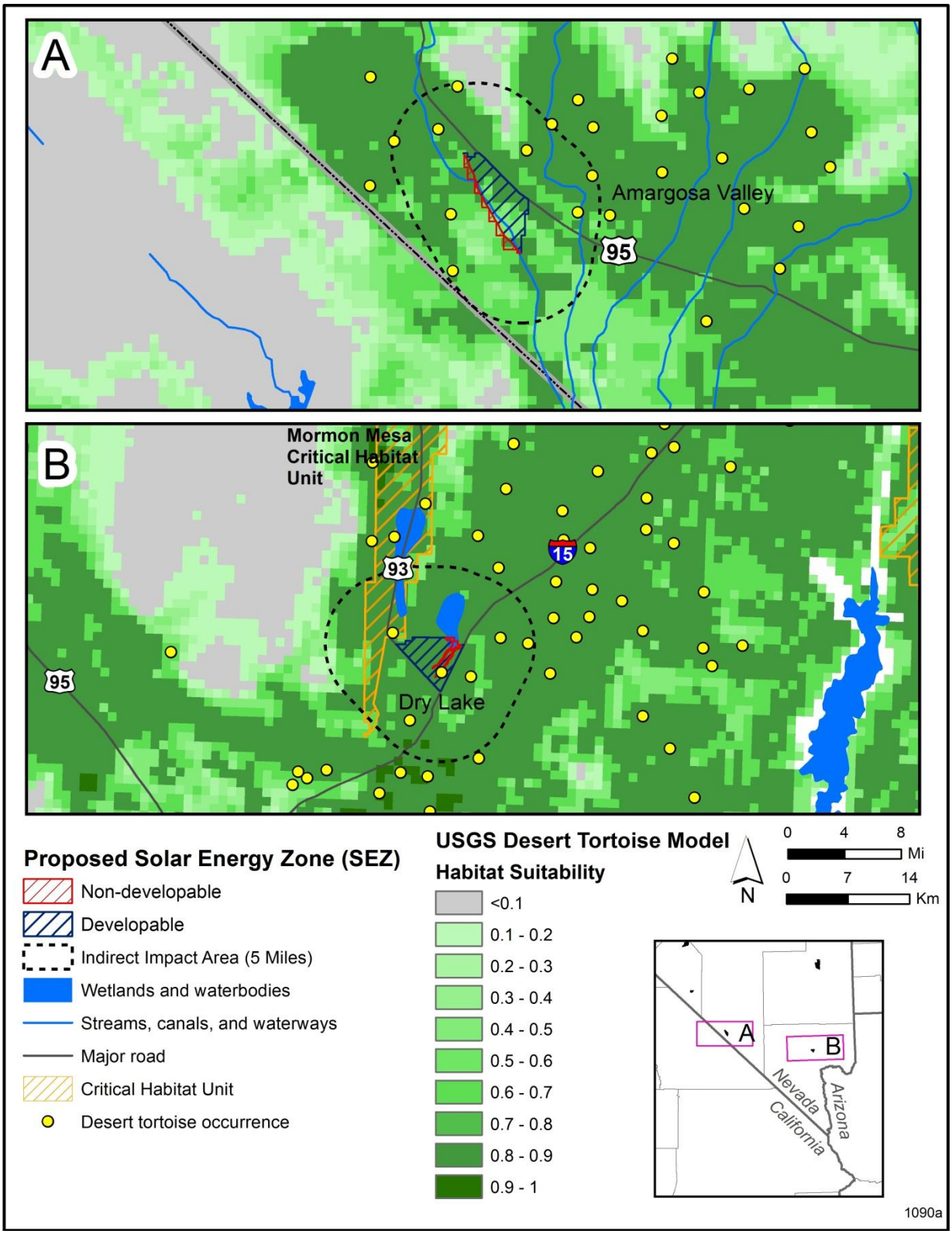

FIGURE 5-3 Known Occurrences and Availability of Potentially Suitable Habitat for the Mojave Desert Tortoise in the Affected Areas of the Proposed (A) Amargosa Valley and (B) Dry Lake SEZs (Sources: Miskow 2009; Nussear et al. 2009)

Direct and Indirect Effects of Development on SEZs

Table 5-1 presents the potential impacts on reptile species that could result from the construction, operation, and decommissioning of utility-scale solar energy facilities, including associated access road corridors. Potentially suitable habitat for the desert tortoise occurs in the area of direct and indirect effects for the Riverside East, Amargosa Valley, Dry Lake, and Dry Lake Valley North SEZs (Table 5-2; Figures 5-2, 5-3, and 5- 4).

Solar energy development on the SEZs may affect the desert tortoise through the loss and degradation of habitat. Individuals may also be killed by project vehicles and equipment during all phases of a solar energy project. Mortality may also occur through increased abundance of predators (e.g., ravens). Any necessary future transmission ROW developments or upgrades to serve solar energy development on these SEZs could also affect the desert tortoise through habitat loss, fragmentation, facilitated spread of diseases or predators, and, potentially, direct mortality. In addition to these direct impacts, facilities on the SEZ could indirectly affect desert tortoises by fragmenting and degrading habitat. Fragmentation would be exacerbated by the installation of exclusionary fencing at the perimeter of the SEZ or individual project areas. If the SEZ is situated between DWMAs or critical habitat units, terrestrial habitats within the SEZ may otherwise provide important linkages between these habitats. In these ways, facilities on the SEZ may affect desert tortoises in nearby DWMAs and designated critical habitat.

Design Features and Applicable Avoidance and Minimization Measures

Programmatic design features that would be required of all solar energy projects to reduce ecological impacts under the proposed program are listed in Section 2.2. However, the implementation of design features alone is unlikely to reduce impacts on the desert tortoise to negligible levels in all SEZs. The appropriateness of some design features and species-specific minimization measures may vary by SEZ depending on the potential for the desert tortoise to occur in the area of direct effects.

For solar energy development within an SEZ that may contain potentially suitable habitat in the areas of direct and indirect effects (Amargosa Valley, Dry Lake, Dry Lake Valley North, and Riverside East), required design features that would reduce the potential for impact on the desert tortoise would focus on determining the potential for the species to occur in the area of direct effects, avoiding inhabited locations in the area of direct effects and avoiding direct and indirect impacts on suitable habitats. For solar energy development within these SEZs, applicable species-specific minimization measures include the following:

- Pre-disturbance surveys for the desert tortoise would be conducted by qualified biologists within the SEZ, and within access road corridors if necessary, to determine the presence of the species and its habitat. If the species or active burrows are found within any potential development areas, those locations would be avoided and adequate setback distances would be established.

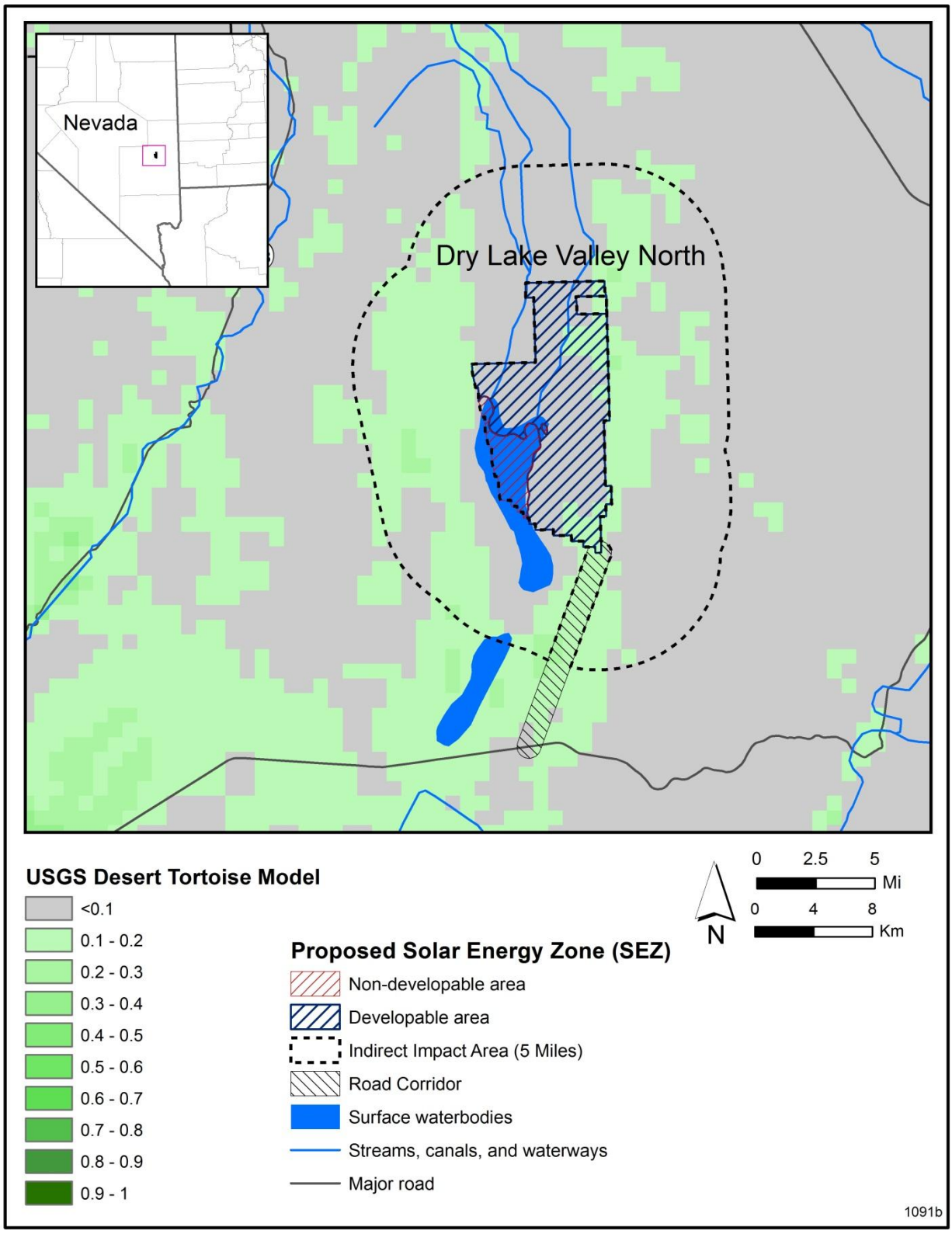

FIGURE 5-4 Known Occurrences and Availability of Potentially Suitable Habitat for the Mojave Desert Tortoise in the Affected Areas of the Proposed Dry Lake Valley North SEZ (Sources: Miskow 2009; Nussear et al. 2009)

- Pre-disturbance coordination with the Service also would be conducted to determine the potential for the desert tortoise to occur outside of the proposed project area, but within the area of potential indirect effects. If the Service determines that the species may be indirectly affected by development, particularly if solar development could disrupt migration between adjacent habitats, solar facilities and access roads would be constructed at appropriate setback distances or other actions necessary to reduce the potential for indirect effects would be taken. Development upslope of any nearby inhabited locations would be prohibited to prevent site runoff from affecting inhabited areas. Noise and lighting restrictions would also be implemented in efforts to avoid disturbing nearby individuals.

In addition to the proposed minimization measures identified above and in Section 2.2, which would reduce the potential for adverse effects from solar energy development on the SEZs, measures that may be considered as compensation for potential effects on the desert tortoise include (1) the funding of land acquisition, enhancement, and protection of Mojave desert tortoise habitat to compensate for any habitat potentially lost or compromised by solar energy development on the SEZs, and (2) the authorization of incidental take statements and implementation of a translocation and monitoring program that would remove individuals from the affected areas to protected areas that would not be directly or indirectly affected by future development. A comprehensive strategy that would include one or more of these measures, as well as additional conservation measures and reasonable and prudent alternatives, would be determined in coordination with the Service.

There are inherent dangers to tortoises associated with their capture, handling, and translocation from the SEZ. These actions, if done improperly, can result in injury or death. To minimize these risks, the desert tortoise translocation plan would be developed in consultation with the Service and follow the *Guidelines for Handling Desert Tortoises during Construction Projects* (Desert Tortoise Council 1994) and other current translocation guidance provided by the Service. Consultation will identify potentially suitable recipient locations, density thresholds for tortoise populations in recipient locations, procedures for pre-disturbance clearance surveys and tortoise handling, as well as disease testing and post-translocation monitoring and reporting requirements.

To offset impacts of solar development on the SEZ, compensation may be needed to balance the acreage of habitat lost with the acquisition of lands that would be improved and protected for desert tortoise populations (USFWS 1994). Compensation can be accomplished by improving the carrying capacity for the desert tortoise on the acquired lands. Other actions to reduce impact may include funding for the habitat enhancement of the desert tortoise on existing federal lands. Consultations with the Service would be necessary to determine the appropriate compensation ratio to acquire, enhance, and preserve desert tortoise habitat.

Effect Determination

With the implementation of all required design features and species-specific avoidance and minimization measures identified above and in Section 2.2, solar energy development in the Amargosa Valley, Dry Lake, and Riverside East SEZs may affect and is likely to adversely affect the desert tortoise. Based on the potential for occurrence of the desert tortoise only in the assumed access road and area of indirect effects of the Dry Lake Valley North SEZ and the expected effectiveness of design features for eliminating indirect effects, solar energy development on that SEZ may affect, but is not likely to adversely affect, the desert tortoise. Solar energy development on other SEZs would not affect this species.

5.2.3 Birds

5.2.3.1 Mexican Spotted Owl

The Mexican spotted owl was listed as a threatened species under the ESA on March 16, 1993 (USFWS 1993). Critical habitat was designated on June 5, 1995, but several court rulings resulted in the Service removing the critical habitat designation on March 25, 1998 (63 FR 14378). Critical habitat for this species was again designated in 2004, comprising approximately 8.6 million acres (35,000 km^2) on federal lands in Arizona, Colorado, New Mexico, and Utah (USFWS 2004). A recovery plan for the Mexican spotted owl was originally published in December 1995 and revised in June 2011 (USFWS 2011a). At the time of federal listing in 1993, the total population of Mexican spotted owls was estimated at 2,100 individuals.

The Mexican spotted owl occurs from southern British Columbia, Canada to central Mexico. It is a rare permanent resident in the southern and eastern parts of Utah and southwestern Colorado (NatureServe 2010; UDWR 2012). The primary habitat of the spotted owl is steep rocky canyons, although forested areas are also important habitat. The spotted owl occupies closed canopy forests in steep canyons with uneven-aged tree stands with high basal area, with an abundance of snags and downed logs. The Mexican spotted owl feeds mainly on rodents but also consumes rabbits, birds, reptiles, and insects. Nest sites are either in trees (typically those with broken tops), tree trunk cavities, and cliffs along canyon walls (NatureServe 2010). Breeding takes place in the spring (March) with egg-laying in late March or early April. After a 30-day incubation period, hatching occurs and fledging takes place in 4 to 5 weeks. The young depend on the adults for food in the summer and eventually disperse from the nesting area in the fall (NatureServe 2010).

Potential threats to the Mexican spotted owl include habitat loss from logging of old-growth forest, disturbance of owls by recreational use on federal lands, overgrazing, loss of habitat and disturbance of owls from road development within canyons, and habitat loss from catastrophic fires.

On the basis of recorded observations and the presence of potentially suitable habitat, the Mexican spotted owl may occur in the affected area of the Antonito Southeast and Los Mogotes East SEZs in Colorado (Table 5-2).

Solar Energy Zones in Which the Species May Occur

Antonito Southeast. The Mexican spotted owl has not been recorded on the Antonito Southeast SEZ or within the affected area. According to the SWReGAP habitat suitability model for the spotted owl (*Strix occidentalis*), potentially suitable habitat for this species does not occur on the SEZ. However, potentially suitable habitat for this species may occur outside of the SEZ within the area of indirect effects. According to the SWReGAP habitat suitability model, approximately 4,800 acres (19 km^2) of potentially suitable habitat for this species may occur in the area of indirect effects outside of the Antonito Southeast SEZ. Designated critical habitat for this species does not occur in the affected area of the Antonito Southeast SEZ.

Los Mogotes East. The Mexican spotted owl has not been recorded on the Los Mogotes East SEZ or within the affected area. According to the SWReGAP habitat suitability model for the spotted owl (*Strix occidentalis*), potentially suitable habitat for this species does not occur on the SEZ. However, potentially suitable habitat for this species may occur outside of the SEZ within the assumed access road corridor and area of indirect effects. According to the SWReGAP habitat suitability model, approximately 14 acres (<0.1 km^2) of potentially suitable habitat for this species may occur in the assumed access road corridor and 3,000 acres (12 km^2) in the area of indirect effects. Designated critical habitat for this species does not occur in the affected area of the Los Mogotes East SEZ.

Direct and Indirect Effects of Development on SEZs

Table 5-1 presents the potential impacts on bird species that could result from the construction, operation, and decommissioning of utility-scale solar energy facilities, including associated access roads. Potentially suitable habitat for the Mexican spotted owl occurs in the areas of direct and indirect effects of the Los Mogotes East SEZ and only within the area of indirect effects of the Antonito Southeast SEZ (Table 5-2; Figure 5-5). Any necessary future transmission ROW developments or upgrades to serve solar energy development on these SEZs are unlikely to occur in suitable habitat for the Mexican spotted owl and are unlikely to directly or indirectly affect this species. The implementation of required design features would avoid disturbing suitable forested habitats and canyonlands for this species, thereby reducing the potential for direct and indirect impacts on this species.

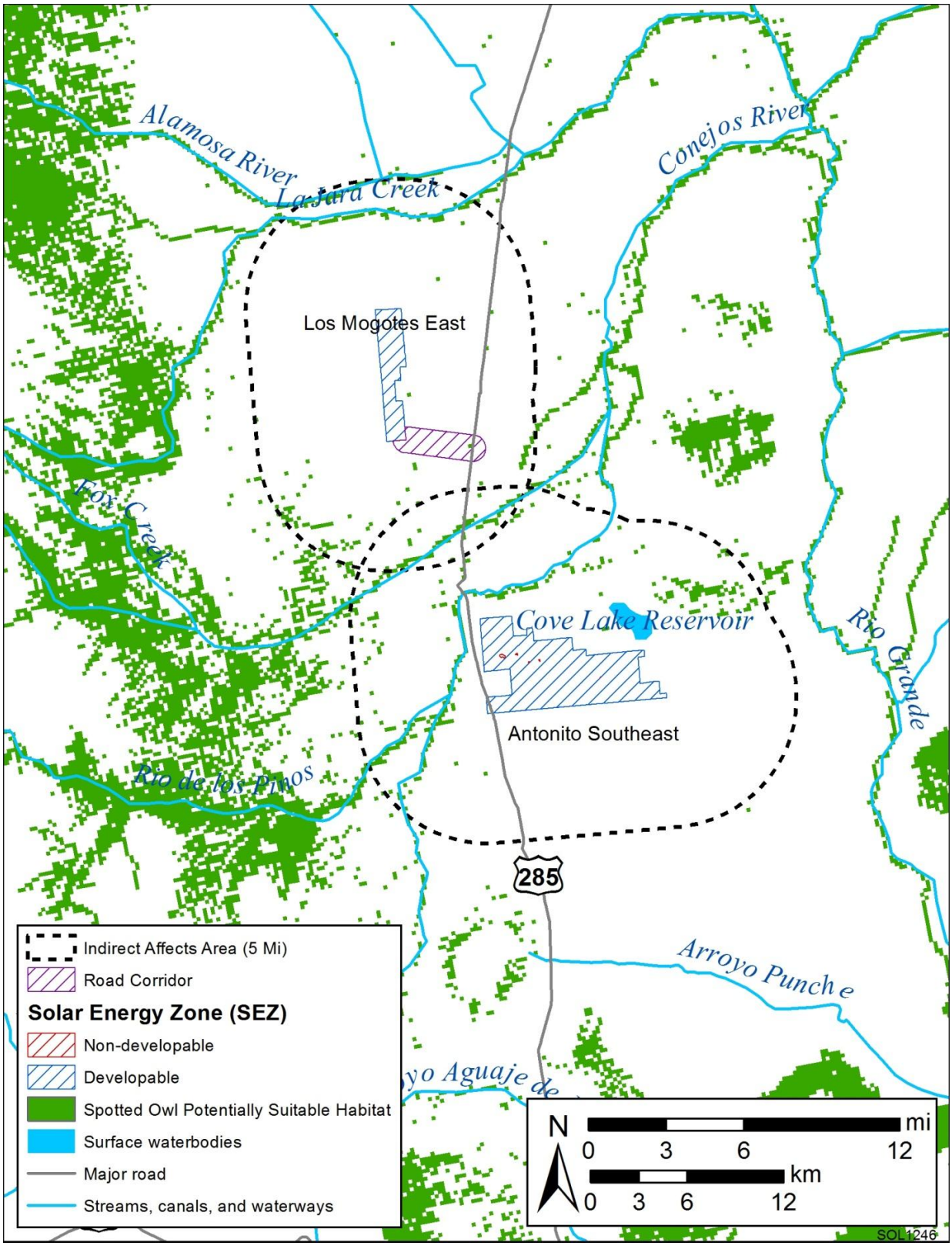

FIGURE 5-5 Availability of Potentially Suitable Habitat for the Mexican Spotted Owl in the Affected Areas of the Antonito Southeast and Los Mogotes East SEZs (Source: USGS 2007)

Design Features and Applicable Avoidance and Minimization Measures

Programmatic design features that would be required of all solar energy projects to reduce ecological impacts under the proposed program are listed in Section 2.2. For solar energy development within the Antonito Southeast and Los Mogotes East SEZs, required design features that would reduce the potential for impact on the Mexican spotted owl would focus on limiting the potential for indirect impacts in areas adjacent to the SEZ. For solar energy development within the Los Mogotes East SEZ, required design features that would reduce the potential for impact on the Mexican spotted owl would focus on limiting the potential for direct impacts resulting from construction and operation of the assumed access road.

For solar energy development within the Antonito Southeast and Los Mogotes East SEZs, required design features that would reduce the potential for impact on the Mexican spotted owl would focus on determining the potential for the species to occur in the area of direct effects, avoiding inhabited locations in the area of direct effects, and avoiding direct and indirect impacts on forested and canyonland habitats. For solar energy development within these SEZs, applicable species-specific avoidance and minimization measures include the following:

- Pre-disturbance surveys for the Mexican spotted owl would be conducted by qualified biologists within the assumed access road corridor to determine the presence of the species and its habitat. If the species or its nests are found within any potential development areas, those locations would be avoided and adequate setback distances would be established.

- Pre-disturbance coordination with the Service would be conducted to determine the potential for the Mexican spotted owl to occur in the vicinity of the proposed project. If the Service determines that the species may be indirectly affected by development, solar facilities and access roads would be constructed at appropriate setback distances or other actions would be taken that are necessary to reduce the potential for indirect effects. Development upslope of any nearby inhabited locations would be prohibited to prevent site runoff from affecting inhabited areas. Noise and lighting restrictions would also be implemented in efforts to avoid disturbing nearby individuals.

- Projects would be sited and designed to avoid direct and indirect impacts on habitats that may be utilized by the Mexican spotted owl. These habitats include coniferous forests and canyonland habitats.

Effect Determination

With the implementation of all required design features and species-specific minimization measures identified above and in Section 2.2, solar energy development in the Antonito Southeast and Los Mogotes East SEZs may affect, but are not likely to adversely affect, the Mexican spotted owl.

5.2.3.2 Northern Aplomado Falcon

The northern aplomado falcon was federally listed as an endangered species under the ESA on February 25, 1986 (USFWS 1986b). Critical habitat for this species has not been designated. The northern aplomado falcon is primarily known from the desert grasslands and savannas of Central America. In the United States, the species is known from southern New Mexico, southern Texas, and southeastern Arizona. This species inhabits desert grasslands with mesquite and yucca, riparian woodlands in open grasslands, and sand ridges with yuccas in coastal prairie regions. In general, open landscapes with scattered trees and shrubs provide good habitat. Other necessary habitat components include moderately low ground cover, an abundance of small to medium-sized birds, and a supply of nesting platforms. Aplomado falcons prey primarily on other birds (e.g., cuckoos, doves, woodpeckers, blackbirds, flycatchers, and thrushes) and supplement their diet with insects, small mammals, reptiles, and amphibians (e.g., grasshoppers, butterflies, crickets, wasps, frogs, lizards, bats, and rodents). Aplomado falcons do not construct their own nests and are thus dependent on nesting platforms constructed by other species, such as the stick nests of Swainson's hawks, crested caracaras, and Chihuahuan ravens. In desert habitats, nest availability is determined by the presence of species that build large nests, such as crows, kites, ravens, or hawks. The breeding season lasts for 6 to 8 months, with most eggs laid between March and May. Clutches consist of 2 to 3 eggs, and the incubation period (both parents tending) lasts 32 days. Nestlings fledge after approximately 35 days and remain in the vicinity of the nest for another month (NatureServe 2010).

At the time of listing, the falcon was no longer breeding in the United States. Prior to listing, the most recent breeding record for the northern aplomado falcon in New Mexico was in 1952. During the 1990s and early 2000s, however, there were occasional sightings of falcons in New Mexico, suggesting that the subspecies is dispersing from breeding locations in Mexico back into the southwestern United States. A total of 22 grassland areas occur within the historical range of the species in southeastern Arizona and southern New Mexico and offer suitable habitat conditions for the aplomado falcon (NMDGF 2010; NatureServe 2010).

The northern aplomado falcon previously experienced large population declines because of pesticides, especially DDT (dichlorodiphenyltrichloroethane) applied in Mexico. It has also lost large areas of suitable desert grassland habitat through brush encroachment and agriculture clearing (NatureServe 2010). Re-introduction of northern aplomado falcons in southern New Mexico and Arizona under Section 10(j) of the ESA began in 2006. These populations are considered to be experimental and non-essential. A nonessential experimental population, as defined in Section 10(j) of the ESA, is a reintroduced population whose loss would not be likely to appreciably reduce the likelihood of survival of the species in the wild; these populations are conferenced with the USFWS as species proposed for listing under the ESA in this BA. The ongoing aplomado falcon reintroduction program in southern New Mexico has thus far reintroduced 305 captive-bred young falcons in the southern part of the state in suitable native grassland habitat. This reintroduction program increases the likelihood of this species' occurrence in suitable habitat near the affected area of the proposed Afton SEZ (Zenone 2012).

Experimental non-essential populations of the northern aplomado falcon may occur throughout southern New Mexico in areas of Chihuahuan desert grassland, especially where

scattered yucca, mesquite, and cactus are present. On the basis of recorded observations and the presence of potentially suitable habitat, introduced experimental non-essential populations of the northern aplomado falcon may occur in the affected area of the Afton SEZ in New Mexico (Table 5-2); however, these populations are unlikely to occur on the SEZ and may only occur within the area of indirect effects. The SEZ is characterized by low habitat suitability for the aplomado falcon (as determined by a field verified habitat suitability model [Young et al. 2002]), but some areas of moderate to high potential suitable habitat occur outside the SEZ in the area of indirect effects (Figure 5-6). There have been only four sightings of aplomado falcons in the Afton SEZ analysis area, ranging from 7 to 13 mi (11 to 21 km) from the Afton SEZ. There are no known nest sites or documented territories within the Afton SEZ (Lister 2012).

According to the SWReGAP habitat suitability model, approximately 1,520 acres (6 km^2) of potentially suitable habitat may occur on the SEZ and 5 acres (<0.1 km^2) within the assumed access road corridor. Approximately 42,180 acres (170 km^2) of potentially suitable habitat occurs in the area of indirect effects. On the basis of SWReGAP land cover data, approximately 50 acres (0.2 km^2) of Chihuahuan grassland habitat occurs on the SEZ. This habitat could represent foraging and nesting habitat. On the basis of this information, it is concluded that portions of the Afton SEZ may provide marginally suitable habitat for the northern aplomado falcon; suitable or highly suitable Chihuahuan desert grassland habitat may occur outside the SEZ in the area of indirect effects (Figure 5-6). Although the SWReGAP land cover and habitat suitability models indicate that potentially suitable habitat for the aplomado falcon may exist on the SEZ, field surveys have indicated that suitable habitat does not exist on the SEZ or within the assumed access road corridor (Lister 2012).

Direct and Indirect Effects of Development on SEZs

Table 5-1 presents the potential impacts on bird species that could result from the construction, operation, and decommissioning of utility-scale solar energy facilities, including associated access roads. Potentially suitable habitat for the northern aplomado falcon does not occur in the area of direct effects of the Afton SEZ; however, field verified potentially suitable habitat occurs in the area of indirect effects. The implementation of required design features would avoid disturbing suitable desert grassland habitats for this species, thereby reducing the potential for direct and indirect impacts on this species. These design features would also minimize or avoid any foreseeable impacts from any necessary future transmission ROW developments or upgrades to the aplomado falcon or its habitat.

Design Features and Applicable Avoidance and Minimization Measures

Programmatic design features that would be required of all solar energy projects to reduce ecological impacts under the proposed program are listed in Section 2.2. For solar energy development within the Afton SEZ, required design features that would reduce the potential for impact on the northern aplomado falcon would focus on determining the potential for the species to occur in the area of direct effects, avoiding inhabited locations in the area of direct effects, and avoiding direct and indirect impacts on Chihuahuan desert grassland habitats. For solar energy

development within the SEZ, applicable species-specific avoidance and minimization measures include the following:

- Pre-disturbance surveys for the northern aplomado falcon would be conducted by qualified biologists within the Afton SEZ area of direct effects to determine the presence of the species and its habitat. If the species or its nests are found within any potential development areas, those locations would be avoided and adequate setback distances would be established. Setback distances around these habitats will be determined during project-level consultation with the Service.

- Pre-disturbance coordination with the Service would be conducted to determine the potential for the northern aplomado falcon to occur in the vicinity of the proposed project. Species survey protocols would be determined in coordination with the Service and the field-verified habitat suitability model (Young et al. 2002) would be used to establish habitat suitability assessment protocols. If necessary, solar facilities and access roads would be constructed at appropriate setback distances or other actions necessary to reduce the potential for indirect effects would be taken. Development upslope of any nearby inhabited locations would be prohibited to prevent site runoff from affecting inhabited areas. Noise and lighting restrictions would also be implemented in efforts to avoid disturbing nearby individuals.

- Projects would be sited and designed to avoid direct and indirect impacts on habitats that may be utilized by the northern aplomado falcon. These habitats include Chihuahuan desert grassland communities. Any necessary setback distances around suitable grassland habitats will be determined during project-level consultation with the Service.

- Projects would be designed to avoid direct and indirect impacts on prey species. Impacts on nesting locations for migratory bird species within the area of direct effects will be avoided as stipulated under the Migratory Bird Treaty Act. In order to minimize impacts on riparian habitats utilized by migratory bird species, there would be no net increase in the rate of groundwater withdrawal to serve development on the SEZ.

- Projects would be designed to avoid direct and indirect impacts on potential nesting habitats for the northern aplomado falcon. The nests of ravens and other raptors within the area of direct effects will be avoided. These nest locations and any other potentially suitable nest trees (especially those containing large abandoned nests) will be avoided within a setback distance approved by the USFWS. The Mimbres RMP currently includes a 0.5 mi (0.8 km) buffer established around known raptor nests for protection from surface disturbance.

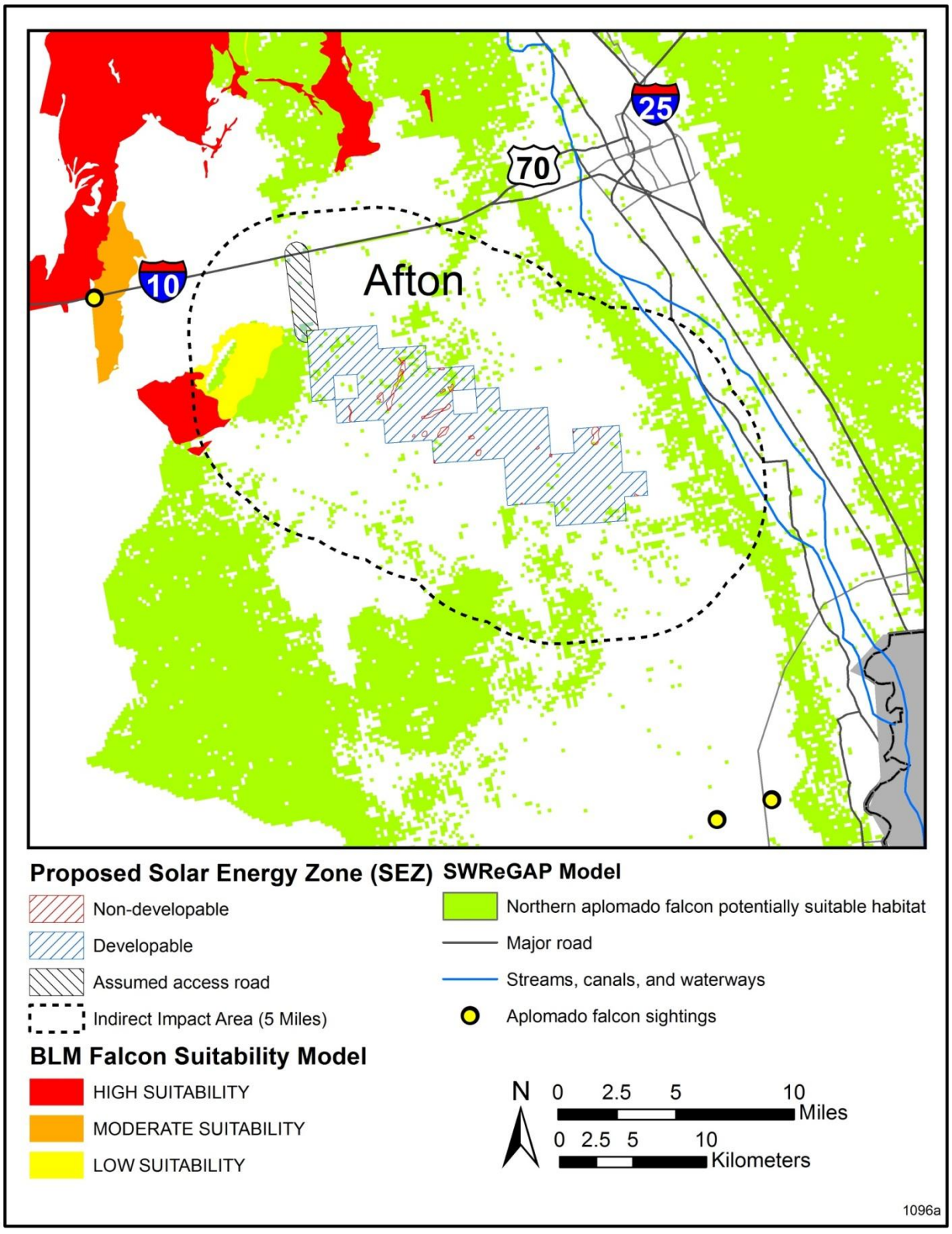

FIGURE 5-6 Known Occurrences and Availability of Potentially Suitable Habitat for the Northern Aplomado Falcon in the Affected Area of the Afton SEZ (Sources: Young et al. 2002; McCullough 2009; USGS 2007)

In addition to the proposed avoidance and minimization measures described above and in Section 2.2, which would reduce the potential for adverse effects from solar energy development on the SEZs, measures that may be considered as compensation for potential effects on the northern aplomado falcon include the funding of land acquisition, enhancement, and protection of northern aplomado falcon habitat, as well as the funding of other recovery actions, to compensate for any habitat potentially lost or compromised by solar energy development on the SEZ. A comprehensive strategy that would include one or more of these measures, as well as additional conservation measures, would be determined in coordination with the Service.

Effect Determination

With the implementation of all required design features and species-specific minimization measures identified above and in Section 2.2, and considering the availability of suitable habitat based on field-verified observations (Young et al. 2002), solar energy development in the Afton SEZ may affect, but is not likely to adversely affect, the northern aplomado falcon. As all potentially affected populations of the northern aplomado falcon are considered nonessential experimental populations (considered as proposed species in this BA), under BLM Manual 6840, the BLM has decided to confer with the Service and to provide information regarding the effect determination for this species. This information may be used by the Service to develop any necessary jeopardy determinations.

5.2.3.3 Southwestern Willow Flycatcher

The southwestern willow flycatcher is a subspecies of willow flycatcher that breeds in southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, and extreme northwest Mexico. It may also breed in southwestern Colorado, but nesting records are lacking. All willow flycatchers are migratory. The southwestern willow flycatcher was federally listed as endangered on February 27, 1995 (USFWS 1995). On July 22, 1997, approximately 599 river mi (960 km) of waterways and their adjacent riparian habitats in Arizona, California, and New Mexico were designated as critical habitat (USFWS 1997). On August 15, 2011, the USFWS proposed the expansion the area of critical habitat to include a total of 2,090 stream miles (3,364 km) of habitat for the southwestern willow flycatcher (USFWS 2011b). The stream segments (including the 100-year floodplain or flood-prone areas) included in the current critical habitat proposal occur in Arizona, California, Colorado, Nevada, New Mexico, and Utah.

The southwestern willow flycatcher occurs in riparian habitats along rivers, streams, or other wetlands, where there are dense growths of willows (*Salix* spp.), baccharis (*Baccharis* spp.), cottonwood (*Populus* spp.), buttonbush (*Cephalanthus* spp.), and other deciduous shrubs and trees. Flycatchers nest in thickets of trees and shrubs that are approximately 13 to 23 ft (4 to 7 m) or more in height, have dense foliage from approximately 13 ft (7 m) above the ground, and often have a high percentage of canopy cover. The diversity of nest site plant species may be low or comparatively high, and nest site vegetation may be even- or uneven-aged, but it is usually dense and structurally homogeneous. Although the southwestern willow flycatcher historically

nested in native plant communities and it still does so when such vegetation is available, the species is now known to nest in thickets dominated by the non-native species (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*). The subspecies virtually always nests near surface water or saturated soil. At some nest sites, surface water may be present early in the breeding season, but by late June or early July, only damp soil is present. Ultimately, a water table close enough to the surface to support riparian vegetation is necessary (NatureServe 2010).

The southwestern willow flycatcher is an insectivore. It forages within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage. It also forages in areas adjacent to nest sites, which may be more open. No information is available on specific prey species.

Southwestern willow flycatchers arrive at breeding sites and begin singing by mid-May; they build nests in late May and early June. Birds construct a cup-shaped nest in a fork or horizontal branch of a medium-sized bush or small tree, approximately 3.2 to 15 ft (1 to 4.5 m) above the ground. Typically, there is dense vegetation above and around the nest. The subspecies fledges young in early to mid-July. Some variations in these dates have been observed; they may be related to altitude, latitude, and re-nesting.

Threats to this species have primarily included habitat loss and degradation. Extensive loss of habitat has occurred through the conversion of floodplains to agriculture, flood-control projects, and urban development. Other threats include overgrazing and brood-parasitism by the brown-headed cowbird (NatureServe 2010).

On the basis of recorded observations and the presence of potentially suitable habitat, the southwestern willow flycatcher may occur in the affected area of six SEZs in three states (Table 5-2): Arizona (Gillespie); Colorado (Antonito Southeast, De Tilla Gulch, Fourmile East, and Los Mogotes East); and Nevada (Dry Lake).

Solar Energy Zones in Which the Species May Occur

Gillespie. The southwestern willow flycatcher is known to occur along the Gila River within 3 mi (5 km) east of the Gillespie SEZ. Potentially suitable habitat for the southwestern willow flycatcher may occur in the access road corridor and the area of indirect effects of the Gillespie SEZ (Figure 5-7). Habitats that may support the southwestern willow flycatcher may also be supported by groundwater from the same basin that may be used to support solar energy development on the Gillespie SEZ (Table 5-2). According to the SWReGAP habitat suitability model, suitable habitat for the southwestern willow flycatcher does not occur in the affected area of the Gillespie SEZ. On the basis of the SWReGAP land cover model, however, approximately 2,000 acres (8 km^2) of riparian habitat occurs within the affected area (Figure 5-7). Designated critical habitat for this species does not occur in the affected area of the Gillespie SEZ.

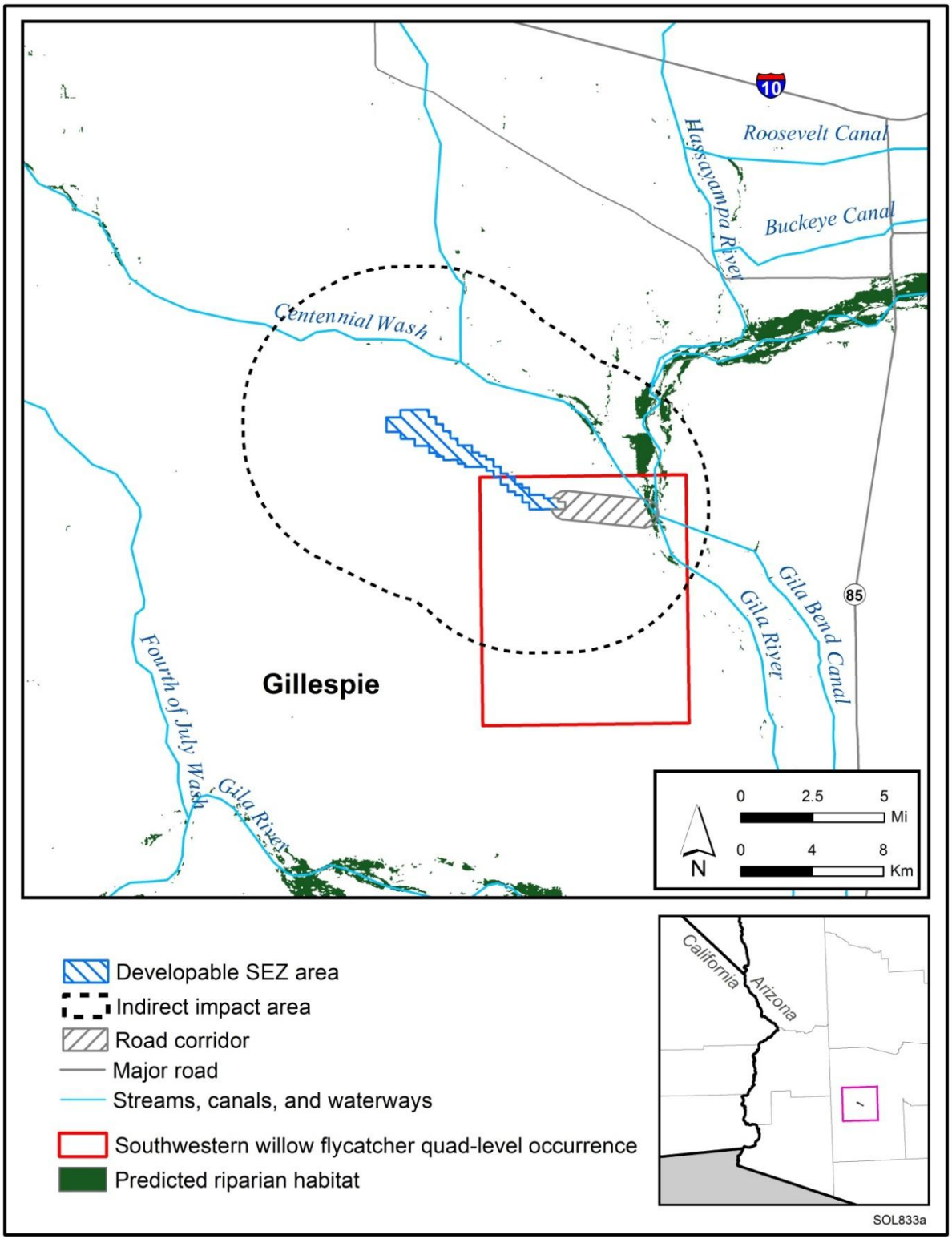

FIGURE 5-7 Known Occurrences and Availability of Potentially Suitable Habitat for the Southwestern Willow Flycatcher in the Affected Area of the Proposed Gillespie SEZ (Sources: Schwartz 2009; USGS 2004, 2007)

Antonito Southeast. The southwestern willow flycatcher is known to occur from the Alamosa NWR, approximately 25 mi (40 km) northeast of the Antonito Southeast SEZ. The species has not been recorded on the SEZ or within the affected area; however, the SWReGAP habitat suitability model predicts the presence of potentially suitable habitat on the SEZ (34 acres [0.1 km^2]) in the vicinity of Alta Lake. Habitats that may support the southwestern willow flycatcher may also be supported by groundwater from the same basin that may be used to support solar energy development on the Antonito Southeast SEZ (Table 5-2). It is unlikely for the species to occur on the SEZ near Alta Lake because of the habitat's small size, isolation, and lack of suitable vegetation, as observed during a July 2009 field visit to the SEZ. Potentially suitable habitat also occurs outside of the SEZ in the area of indirect effects, particularly in riparian areas along the Conejos River and Rio San Antonio (Figure 5-8). According to the SWReGAP habitat suitability model, approximately 5,000 acres (20 km^2) of potentially suitable habitat for this species may occur in the area of indirect effects outside of the Antonito Southeast SEZ. Designated critical habitat for this species does not occur in the affected area of the Antonito Southeast SEZ. However, proposed critical habitat does occur along the Conejos River, which is within the area of indirect effects approximately 4 mi (6 km) north of the SEZ.

De Tilla Gulch. The southwestern willow flycatcher is known to occur from the Alamosa NWR, approximately 38 mi (61 km) southeast of the De Tilla Gulch SEZ. The species has not been recorded on the SEZ or within the area of indirect effects; however, SWReGAP indicates the presence of potentially suitable habitat for the species in the area of indirect effects—particularly in riparian areas along Saguache Creek (Figure 5-9). Habitats that may support the southwestern willow flycatcher may also be supported by groundwater from the same basin that may be used to support solar energy development on the De Tilla Gulch SEZ (Table 5-2). According to the SWReGAP habitat suitability model, approximately 670 acres (3 km^2) of potentially suitable habitat for this species may occur in the area of indirect effects outside of the SEZ. Potentially suitable habitat for the southwestern willow flycatcher does not occur on the SEZ. Designated critical habitat for this species does not occur in the affected area of the De Tilla Gulch SEZ.

Fourmile East. The southwestern willow flycatcher is known to occur from the Alamosa NWR, approximately 8 mi (13 km) southwest of the Fourmile East SEZ. The species has not been recorded on the SEZ or within the affected area. According to the SWReGAP habitat suitability model, potentially suitable habitat for the southwestern willow flycatcher does not occur on the SEZ. However, potentially suitable habitat may occur outside of the SEZ in the area of indirect effects, particularly among habitats associated with the Blanca Wetlands (Figure 5-9). In addition, habitats that may support the southwestern willow flycatcher may also be supported by groundwater from the same basin that may be used to support solar energy development on the Fourmile East SEZ (Table 5-2). According to the SWReGAP habitat suitability model, approximately 525 acres (2 km^2) of potentially suitable habitat for this species may occur in the area of indirect effects outside of the Fourmile East SEZ. Designated critical habitat for this species does not occur in the affected area of the Fourmile East SEZ.

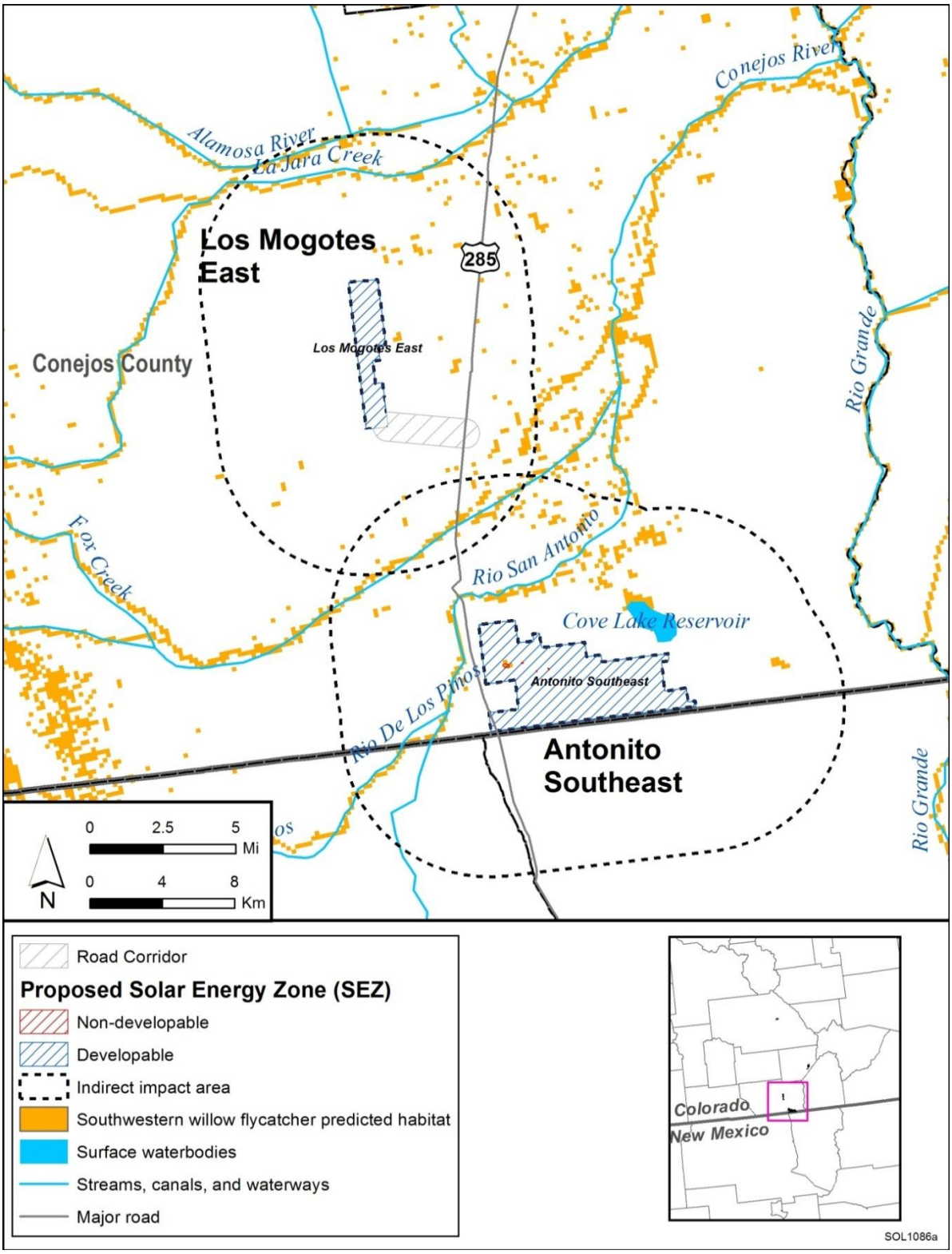

FIGURE 5-8 Availability of Potentially Suitable Habitat for the Southwestern Willow Flycatcher in the Affected Areas of the Antonito Southeast and Los Mogotes East SEZs (Source: USGS 2007)

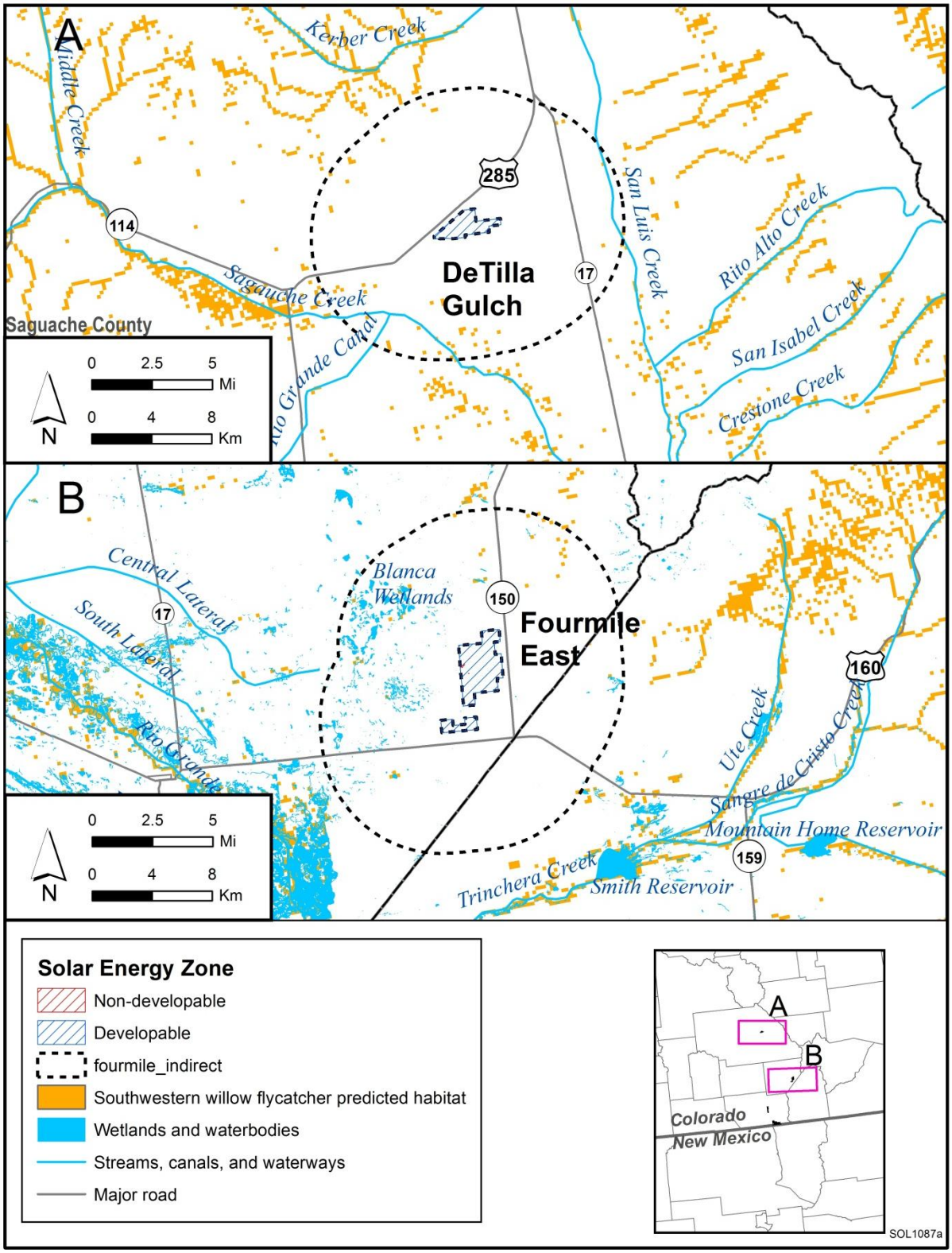

FIGURE 5-9 Availability of Potentially Suitable Habitat for the Southwestern Willow Flycatcher in the Affected Areas of the Proposed (A) De Tilla Gulch and (B) Fourmile East SEZs (Source: USGS 2007)

Los Mogotes East. The southwestern willow flycatcher is known to occur from the Alamosa NWR, approximately 18 mi (29 km) northeast of the Los Mogotes East SEZ. The species has not been recorded on the SEZ or within the affected area. According to the SWReGAP habitat suitability model, potentially suitable habitat for the southwestern willow flycatcher does not occur on the SEZ or within the assumed access road corridor. However, potentially suitable habitat does occur outside of the SEZ in the area of indirect effects, particularly along riparian habitats associated with the Alamosa River, the Conejos River, and La Jara Creek (Figure 5-8). Habitats that may support the southwestern willow flycatcher may also be supported by groundwater from the same basin that may be used to support solar energy development on the Los Mogotes East SEZ (Table 5-2). According to the SWReGAP habitat suitability model, approximately 3,600 acres (15 km^2) of potentially suitable habitat for this species may occur in the area of indirect effects outside of the Los Mogotes East SEZ. Designated critical habitat for this species does not occur in the affected area of the Los Mogotes East SEZ. However, proposed critical habitat does occur along the Conejos River, which is within the area of indirect effects approximately 4 mi (6 km) south of the SEZ.

Dry Lake. The southwestern willow flycatcher is known from the Muddy and Virgin River systems, approximately 20 mi (32 km) east of the Dry Lake SEZ. The species has not been recorded on the Dry Lake SEZ or within the affected area. According to the SWReGAP habitat suitability model, potentially suitable habitat for the southwestern willow flycatcher does not occur on the SEZ. However, approximately 20 acres (0.1 km^2) of potentially suitable habitat for this species may occur in the area of indirect effects outside of the Dry Lake SEZ (Figure 5-10). In addition, habitats that may support the southwestern willow flycatcher may also be supported by groundwater from the same basin that may be used to support solar energy development on the Dry Lake SEZ (Table 5-2). Designated critical habitat for this species does not occur in the affected area of the Dry Lake SEZ.

Direct and Indirect Effects of Development on SEZs

Table 5-1 presents the potential impacts on bird species that could result from the construction, operation, and decommissioning of utility-scale solar energy facilities, including associated access road corridors. Potentially suitable habitat for the southwestern willow flycatcher (as determined by the SWReGAP habitat suitability model) occurs in the areas of direct and indirect effects (includes SEZ, road corridor, or transmission ROW, and area of indirect effects or groundwater) for the Gillespie SEZ in Arizona and the Antonito Southeast SEZ in Colorado (Table 5-2; Figures 5-7 and 5-8). Potentially suitable habitat occurs only in the area of indirect effects (including groundwater) for the Los Mogotes East, De Tilla Gulch, and Fourmile East SEZs in Colorado and the Dry Lake SEZ in Nevada (Table 5-2; Figures 5-8, 5-9, and 5-10). Suitable habitat areas that contain those required elements needed by the southwestern willow flycatcher are not known to occur on any of the SEZs or in any of the areas of direct effects. Thus, implementation of required design features would avoid disturbing suitable habitats as well as other wetland and riparian habitats, thereby minimizing the potential for direct and indirect impacts on this species. These design features would also minimize or avoid any foreseeable impacts on the southwestern willow flycatcher or its habitat from any necessary future transmission ROW developments or upgrades for these SEZs.

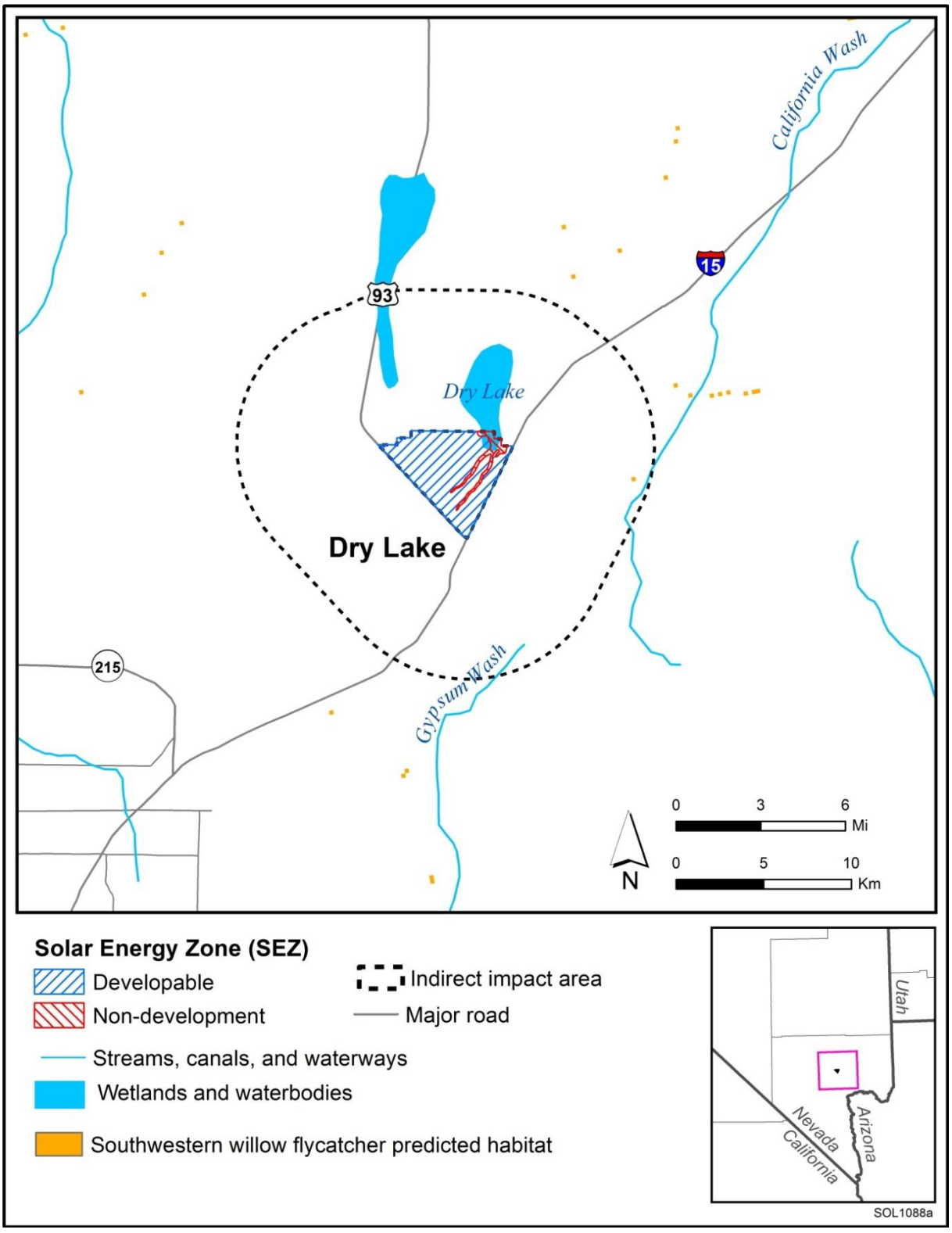

FIGURE 5-10 Known Occurrences and Availability of Potentially Suitable Habitat for the Southwestern Willow Flycatcher in the Affected Area of the Proposed Dry Lake SEZ (Source: USGS 2007)

Design Features and Applicable Avoidance and Minimization Measures

Although potentially suitable habitat for the southwestern willow flycatcher may occur in the affected area of six SEZs in three states, the implementation of design features and species-specific minimization measures would reduce or eliminate impacts of solar energy development within these SEZs on the southwestern willow flycatcher. Programmatic design features that would be required of all solar energy projects to reduce ecological impacts under the proposed program are listed in Section 2.2.

The appropriateness of some design features and species-specific minimization measures may vary by SEZ depending on the currently known potential for the southwestern willow flycatcher to occur in the area of direct effects (SEZ, road corridors, or transmission ROWs).

For solar energy development within an SEZ that may contain potentially suitable habitat in the areas of direct and indirect effects (Antonito Southeast and Gillespie), required design features that would reduce the potential for impact on the southwestern willow flycatcher would focus on determining the potential for the species to occur on the site, avoiding known locations in the area of direct effects, and avoiding direct and indirect impacts on riparian and wetland habitats. For solar energy development within an SEZ that may contain potentially suitable habitat only in the area of indirect effects (De Tilla Gulch, Dry Lake, Fourmile East, and Los Mogotes East), required design features that would reduce the potential for impact on the southwestern willow flycatcher would focus on limiting the potential for indirect impacts on riparian and wetland habitats. Applicable species-specific avoidance and minimization measures include the following:

- Pre-disturbance surveys for the southwestern willow flycatcher would be conducted by qualified biologists within the SEZ, and within access road corridors if necessary, to determine the presence of the southwestern willow flycatcher and its habitat. If the species or suitable habitat is found within any potential development areas, those locations would be avoided and adequate setback distances would be established.

- Pre-disturbance coordination with the Service also would be conducted to determine the potential for the southwestern willow flycatcher to occur outside of the proposed project area, but within the area of potential indirect effects. If the Service determines that the species may be indirectly affected by development, solar facilities and access roads would be constructed at appropriate setback distances or other actions would be taken that are necessary to reduce the potential for indirect effects. Development upslope of any nearby inhabited locations would be prohibited to prevent site runoff from affecting inhabited areas. Noise and lighting restrictions would also be implemented in efforts to avoid disturbing nearby individuals.

- Projects would be sited and designed to avoid direct and indirect impacts on habitats that may be utilized by the southwestern willow flycatcher. These habitats include waters of the United States, streams (ephemeral, intermittent,

and perennial), springs, seeps, ponds and other aquatic habitats, riparian habitat, marshes, and playas.

Effect Determination

With the implementation of all required design features and species-specific avoidance and minimization measures identified above and in Section 2.2, solar energy development in the Gillespie, Antonito Southeast, Los Mogotes East, De Tilla Gulch, Fourmile East, and Dry Lake SEZs may affect, but is not likely to adversely affect, the southwestern willow flycatcher. Solar energy developments within these SEZs will have no effect on either designated or proposed critical habitat for the southwestern willow flycatcher. Solar energy development on other SEZs would not affect this species.

5.2.3.4 Yuma Clapper Rail

The Yuma clapper rail is a subspecies of clapper rail that occurs in inland habitats in the southwestern United States. The Yuma clapper rail was federally listed as endangered on March 11, 1967 (USFWS 1967). Critical habitat for this species has not been designated. Yuma clapper rails are found in shallow, freshwater marshes containing dense stands of cattails and bulrushes, along the Colorado River from California, southern Nevada, and Arizona south into Mexico. They also occur in dense, near-monotypic stands of cattail at the Salton Sea in Imperial County, California, and in marshes and riparian habitats in western Arizona and southern Nevada. Unlike other clapper rails, which are associated with tidal marshes, the Yuma clapper rail occupies freshwater marshes during the breeding season. Until recently, most of the population was thought to retreat to Mexico during the winter; it is now estimated that more than 70% of the breeding population winters along the Lower Colorado River (AZGFD 2010; CDFG 2010b; NatureServe 2010).

The Yuma clapper rail feeds on crayfish and other crustaceans, and it is believed that the abundance of food animals at a particular site is a better predictor of rail population densities than is vegetation. Yuma clapper rails breed from March through July. Nests are built in three major microhabitats: at the base of living clumps of cattail or bulrush, under wind-thrown bulrush, or on the top of dead cattails remaining from the previous year's growth. Nesting materials and cover are obtained from mature cattail/bulrush stands. Clutch size is typically six to eight eggs, and most eggs hatch during the first week of June (NatureServe 2010).

Threats to continued survival of the Yuma clapper rail include loss and degradation of habitat by activities such as water projects and the draining or filling of marshes for development or agriculture. Other threats to this species include catastrophic flooding; invasion of non-native plant species such as tamarisk; and pollution from urban runoff, industrial discharges, and sewage effluent. Although population numbers of the species appear to be stable, habitat throughout its range is not secure (NatureServe 2010).

On the basis of recorded observations and the presence of potentially suitable habitat, the Yuma clapper rail may occur in the affected area of two SEZs in two states (Table 5-2): Arizona (Gillespie), and California (Imperial East).

Solar Energy Zones in Which the Species May Occur

Gillespie. The Yuma clapper rail is known to occur along the Gila and Hassayampa Rivers about 3 mi (5 km) east of the Gillespie SEZ. On the basis of the SWReGAP habitat suitability model, potentially suitable habitat for this species does not occur on the SEZ. However, potentially suitable habitat may occur within the assumed access road corridor that is in proximity to riparian areas along the Gila River (Figure 5-11). Habitats that may support the Yuma clapper rail may also be supported by groundwater from the same basin that may be used to support solar energy development on the Gillespie SEZ (Table 5-2). According to the SWReGAP habitat suitability model, approximately 2,000 acres (8 km^2) of potentially suitable habitat for the Yuma clapper rail occurs in the affected area of the Gillespie SEZ, of which approximately 2 acres (<0.1 km^2) is estimated to occur in the area of direct effects within the access road corridor. The remaining suitable habitat is estimated to occur in the area of indirect effects within 5 mi (8 km) of the SEZ boundary (Figure 5-11).

Imperial East. The Yuma clapper rail is known to occur along the All-American Canal about 0.5 mi (0.8 km) south of the Imperial East SEZ. Potentially suitable riparian or wetland habitat for this species may occur on the Imperial East SEZ and within the area of indirect effects. The Service has identified seepage wetland habitats associated with the All-American Canal that could occur in or near the SEZ and could provide habitat for this species (Stout 2009). According to the SWReGAP habitat suitability model, approximately 44 acres (0.2 km^2) of potentially suitable wetland habitat is predicted to occur on the SEZ; approximately 3,230 acres (13 km^2) of potentially suitable riparian and wetland habitat is predicted to occur in the area of indirect effects within 5 mi (8 km) of the SEZ boundary (Figure 5-11). A site visit in 2009 confirmed the presence of potentially suitable habitat along the canal, although no individuals were observed. Habitats that may support the Yuma clapper rail may also be supported by groundwater from the same basin that may be used to support solar energy development on the Imperial East SEZ (Table 5-2).

Direct and Indirect Effects of Development on SEZs

Table 5-1 presents the potential impacts on bird species that could result from the construction, operation, and decommissioning of utility-scale solar energy facilities, including associated access road corridors. Potentially suitable habitat for the Yuma clapper rail occurs in the areas of direct and indirect effects for the Imperial East and Gillespie SEZs (Table 5-2; Figure 5-11). However, the implementation of required design features (Section 2.2) would avoid disturbing wetland and riparian habitats, thereby minimizing the potential for direct and indirect impacts on this species. These design features would also minimize or avoid any

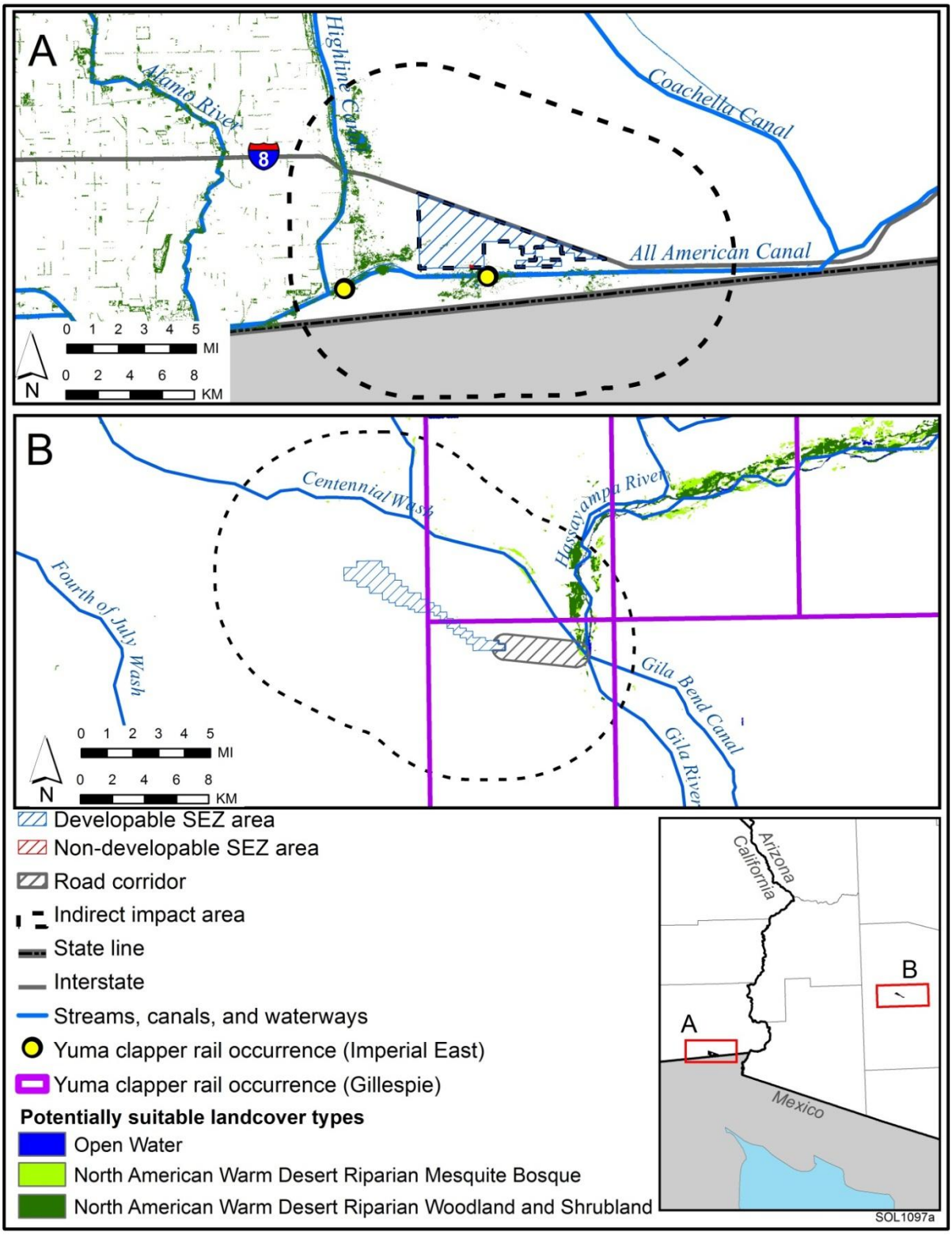

FIGURE 5-11 Known Occurrences and Availability of Potentially Suitable Habitat for the Yuma Clapper Rail in the Affected Areas of the Proposed (A) Imperial East and (B) Gillespie SEZs (Sources: CDFG 2010a; Miskow 2009; USGS 2004)

foreseeable impacts on the Yuma clapper rail or its habitat from any necessary future transmission ROW developments or upgrades for these SEZs.

Design Features and Applicable Avoidance and Minimization Measures

Although potentially suitable habitat for the Yuma clapper rail may occur in the affected area of two SEZs in two states, the implementation of design features and species-specific minimization measures would reduce or eliminate impacts of solar energy development within these SEZs on the Yuma clapper rail. Programmatic design features that would be required of all solar energy projects to reduce ecological impacts under the proposed program are listed in Section 2.2.

For solar energy development within the Imperial East and Gillespie SEZs, required design features that would reduce the potential for impact on the Yuma clapper rail would focus on determining the potential for the species to occur in the area of direct effects, avoiding known locations in the area of direct effects, and avoiding direct and indirect impacts on riparian and wetland habitats. For solar energy development within these SEZs, applicable species-specific avoidance and minimization measures include the following:

- Pre-disturbance surveys for the Yuma clapper rail would be conducted by qualified biologists within the SEZ, and within access road corridors if necessary, to determine the presence of the species and its habitat. If the species is found within any potential development areas, those locations would be avoided and adequate setback distances would be established.

- Projects would be sited and designed to avoid direct and indirect impacts on habitats that may be utilized by the Yuma clapper rail. These habitats include waters of the United States, streams (ephemeral, intermittent, and perennial), springs, seeps, ponds and other aquatic habitats, riparian habitat, marshes, and playas.

Effect Determination

With the implementation of all required design features and species-specific minimization measures identified above and in Section 2.2, solar energy development in the Gillespie and Imperial East SEZs may affect, but is not likely to adversely affect, the Yuma clapper rail. Solar energy development on other SEZs would not affect this species.

5.2.4 Mammals

5.2.4.1 Utah Prairie Dog

The Utah prairie dog is endemic to southwestern Utah, where it occurs in grasslands, level mountain valleys, and areas with deep, well-drained soils and low-growing vegetation that

allows for good visibility. It is one of three prairie dog species in the state of Utah. Utah prairie dogs are diurnal herbivores that live in colonies and spend much of their time underground. They are inactive or torpid in severe winter weather. Adults emerge from mid-March to early April. Breeding occurs in the spring, and young emerge from the burrows during May and early June. Adults are often dormant from mid-July to mid-August and are not often seen above ground during this period. Juveniles enter dormancy during October and November (NatureServe 2010; USFWS 2010b).

The Utah prairie dog feeds primarily on grasses and various seeds and flowers of shrubs and insects when available. Common plant species consumed include alfalfa, leafy aster, European glorybind, and wild buckwheat seeds. The size of the home range of the Utah prairie dog varies, depending on the quality of the habitat, from 3 to 20 acres (0.01 to 0.08 km^2). Available habitat for the Utah prairie dog has declined from an estimated 448,000 acres (1,813 km^2) to less than 7,000 acres (28 km^2) at the present time (NatureServe 2010; USFWS 2010b).

The Utah prairie dog was first listed as federally endangered on June 4, 1973 (USFWS 1973). In 1984, it was reclassified as threatened by the Service (USFWS 1984). Critical habitat has not been designated for the Utah prairie dog. A recovery plan that was prepared in 1991 and revised in 2010 (USFWS 2010b) described the current extent of the existing populations and laid out management goals for ensuring the continued survival of the species. A major goal was to improve the chances of long-term survival of the species in the following areas: West Desert in southern Beaver and Iron Counties; Paunsaugunt in western Garfield County, eastern Iron County, and extreme northwestern Kane County; and the Awapa Plateau, which extends from Sevier County southward through western Wayne and Piute Counties into northern Garfield County. No updated information on the population sizes or the success and locations of transplanted populations has been found. The recovery plan also described plans to transplant Utah prairie dogs to unoccupied habitats, and it defined procedures for monitoring the transplants.

The size of its population has varied considerably during historic times. In 1920, before programs to control the Utah prairie dog, its total population was estimated at 95,000. Shooting and poisoning of the species by ranchers (and likely periodic reductions from the plague) led to a decrease in the size of the population; it was estimated to be about 3,700 by 1984. By the spring of 1989, the adult population reached 9,200. The Service reported that, at this size, the population was considered as being at risk of a crash from a plague outbreak (NatureServe 2010; USFWS 2010b).

On the basis of recorded observations and the presence of potentially suitable habitat, the Utah prairie dog may occur in the affected areas of three SEZs (Escalante Valley, Milford Flats South, and Wah Wah Valley) in Utah (Table 5-2; Figure 5-12).

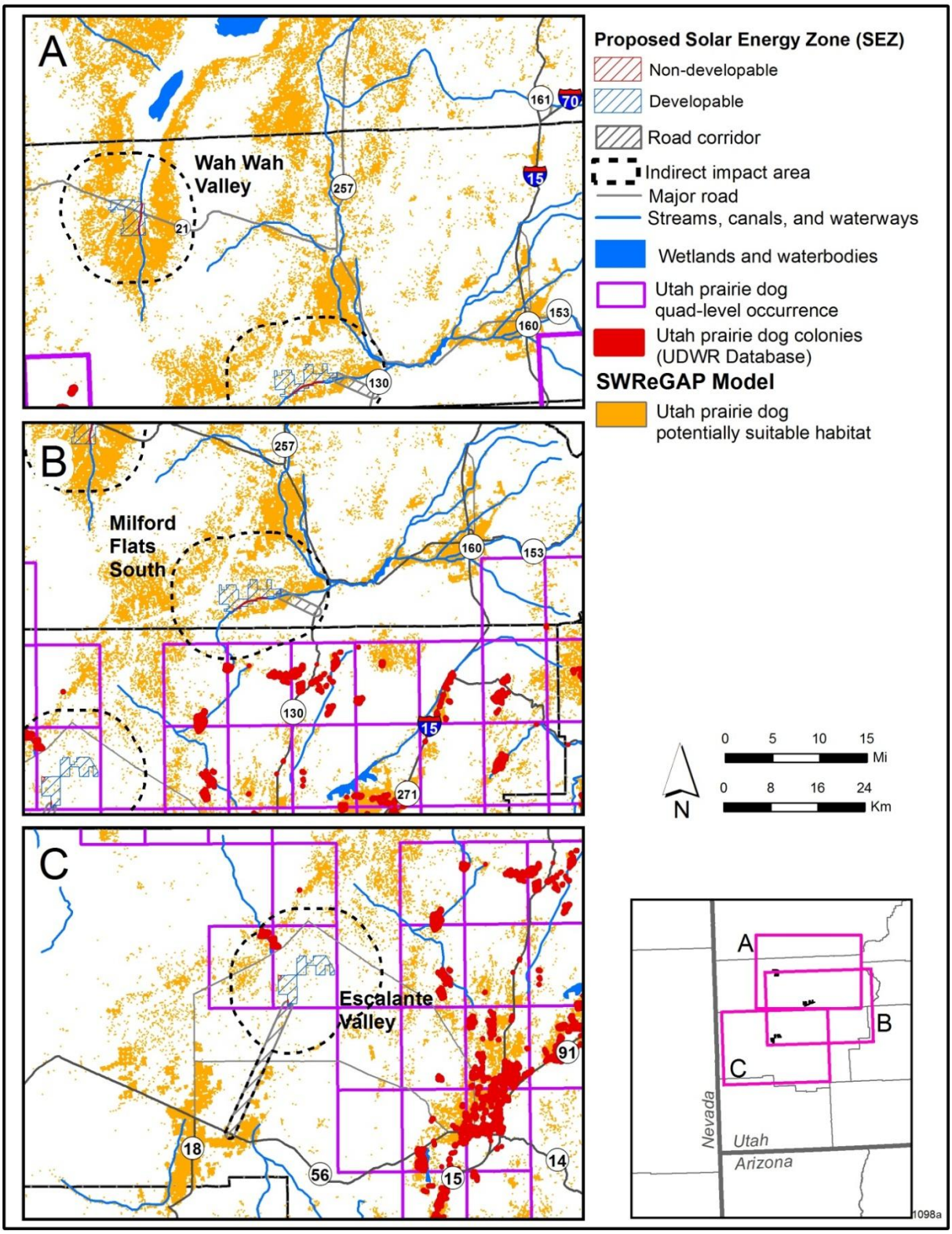

FIGURE 5-12 Known Occurrences and Availability of Potentially Suitable Habitat for the Utah Prairie Dog in the Affected Areas of the Proposed (A) Wah Wah Valley, (B) Milford Flats South, and (C) Escalante Valley SEZs (Sources: UDWR 2009; USGS 2007)

Solar Energy Zones in Which the Species May Occur

Escalante Valley. The Utah prairie dog is known to occur approximately 5 mi (8 km) north of the Escalante Valley SEZ. Data provided by the Utah prairie dog colony tracking database[3] also indicate the presence of active Utah prairie dog colonies within the area of indirect effects, approximately 5 mi (8 km) north of the Escalante Valley SEZ. Potentially suitable habitat for the Utah prairie dog may occur on the Escalante Valley SEZ, within the assumed access road corridor, and within the area of indirect effects. According to the SWReGAP habitat suitability model, approximately 398 acres (2 km^2) of potentially suitable habitat may occur in the area of direct effects within the Escalante Valley SEZ; an additional 8 acres (<0.1 km^2) of potentially suitable habitat may occur in the area of direct effects within the assumed access road corridor. Approximately 10,750 acres (44 km^2) of potentially suitable habitat may occur in the area of indirect effects (Figure 5-12).

Milford Flats South. The Utah prairie dog is known to occur about 5 mi (8 km) from the Milford Flats South SEZ. Data provided by the Utah prairie dog colony tracking database also indicate the presence of active Utah prairie dog colonies outside the affected area, approximately 10 mi (16 km) south of the Milford Flats South SEZ. Potentially suitable habitat for the Utah prairie dog may occur on the Milford Flats South SEZ, within the assumed access road corridor, and within the area of indirect effects. According to the SWReGAP habitat suitability model, approximately 1,800 acres (7 km^2) of potentially suitable habitat may occur in the area of direct effects within the Milford Flats South SEZ. An additional 11 acres (<0.1 km^2) of potentially suitable habitat may occur in the area of direct effects within the assumed access road corridor. Approximately 29,200 acres (118 km^2) of potentially suitable habitat may occur in the area of indirect effects (Figure 5-12).

Wah Wah Valley. Quad-level occurrences for the Utah prairie dog exist approximately 20 mi (32 km) south of the Wah Wah Valley SEZ. Data provided by the Utah prairie dog colony tracking database also indicate the presence of active Utah prairie dog colonies outside the affected area, approximately 18 mi (29 km) southwest of the Wah Wah Valley SEZ. Potentially suitable habitat for the Utah prairie dog may occur on the Wah Wah Valley SEZ and within the area of indirect effects. According to the SWReGAP habitat suitability model, approximately 2,940 acres (12 km^2) of potentially suitable habitat may occur in the area of direct effects within the Wah Wah Valley SEZ. Approximately 47,350 acres (192 km^2) of potentially suitable habitat may occur in the area of indirect effects (Figure 5-12).

[2] The Utah prairie dog colony tracking database contains sensitive data provided by the Utah Division of Wildlife Resources (UDWR) for official use only. These data were used for the analyses in this BA, but the distributions were not displayed on figures in this BA.

Direct and Indirect Effects of Development on SEZs

Table 5-1 presents the potential impacts on mammal species that could result from the construction, operation, and decommissioning of utility-scale solar energy facilities, including associated access road corridors. Potentially suitable habitat for the Utah prairie dog occurs in the areas of direct and indirect effects of the Escalante Valley, Milford Flats South, and Wah Wah Valley SEZs (Table 5-2; Figure 5-12). The implementation of required design features (Section 2.2) and species-specific measures identified below would be sufficient to reduce impacts on this species. These measures would also minimize or avoid any foreseeable impacts on the Utah prairie dog or its habitat from any necessary future transmission ROW developments or upgrades for these SEZs.

Design Features and Applicable Avoidance and Minimization Measures

Programmatic design features that would be required of all solar energy projects to reduce ecological impacts under the proposed program are listed in Section 2.2. For solar energy development within the Escalante Valley, Milford Flats South, and Wah Wah Valley SEZs, required design features that would reduce the potential for impacts on the Utah prairie dog would focus on determining the potential for the species to occur in the area of direct effects and avoiding known locations in the area of direct effects. For solar energy development within these SEZs, applicable species-specific avoidance and minimization measures include the following:

- Pre-disturbance surveys for the Utah prairie dog would be conducted by qualified biologists within each SEZ, and within the assumed access road corridor if necessary, to determine the presence of the species and its habitat. In addition, areas outside of the project area, but within the area of potential indirect effects, would be surveyed for this species. If the species is found within any potential development areas or areas of indirect effects, those locations would be avoided and adequate setback distances would be established.

- The past or current occurrence of Utah prairie dogs in the SEZ affected area will be determined by certified biologists following the *Utah Prairie Dog Occupancy and Habitat Survey Protocol for Federal Section 7 Consultations* (Appendix F of the *Utah Prairie Dog Draft Recovery Plan* [USFWS 2010b]). Surface occupancy or other surface-disturbing activities within a 0.5-mi (0.8-km) buffer around Utah prairie dog habitat, defined as occupied or unoccupied (but previously supported) Utah prairie dog habitat will be avoided. Spatial data for currently known Utah prairie dog habitat are maintained in the Utah prairie dog colony tracking database by the Utah Division of Wildlife and are illustrated in Figure 5-12.

In addition to the proposed avoidance and minimization measures described above and in Section 2.2, which would reduce the potential for adverse effects from solar energy development on the SEZs, measures that may be considered as compensation for potential effects include

(1) buffering potentially suitable habitats and unoccupied burrows that might represent suitable habitat and avoid disturbing those areas; (2) the funding of land acquisition, enhancement, and protection of Utah prairie dog habitat to compensate for any habitat potentially lost or compromised by solar energy development on the SEZs; and (3) the authorization of incidental take statements and implementation of a translocation and monitoring program that would remove individuals from the affected areas to protected areas that would not be directly or indirectly affected by future development. A comprehensive strategy that would include one or more of these measures, as well as additional conservation measures and reasonable and prudent alternatives, would be determined in coordination with the Service.

Effect Determination

With the implementation of all required design features and species-specific avoidance and minimization measures identified above and in Section 2.2, solar energy development in the Escalante Valley, Milford Flats South, and Wah Wah Valley SEZs may affect but is not likely to adversely affect the Utah prairie dog.

5.2.5 Groundwater-Dependent Species

There are 14 ESA-listed aquatic and wetland species with habitats that are dependent upon regional groundwater supplies (Table 5-2). Habitats influenced by groundwater supply include wet meadows, seeps, springs, streams (intermittent, perennial, and permanent), and wetlands. Groundwater withdrawn from this basin to serve construction and operations of solar energy facilities on the SEZ could affect aquatic and wetland habitats for the ESA-listed species that are dependent on groundwater. Such impacts would result from the lowering of the water table and alteration of hydrologic processes.

The 17 groundwater-dependent species may occur in the same groundwater basin as the Amargosa Valley and Dry Lake SEZs (Table 5-2). Impacts of groundwater depletion from solar energy development on the SEZs cannot be quantified without identification of the total amount of groundwater needed to support development. Consequently, the overall effects on these species could vary depending in part on the solar energy technology deployed, the scale of development within the SEZ, the type of cooling system used, and the degree of influence of water withdrawals in the SEZ on drawdown and surface water discharges in habitats supporting these species. However, the implementation of design features identified in Section 2.2 (including the avoidance of groundwater withdrawals from groundwater systems that would adversely affect listed species) may reduce impacts on groundwater-dependent species to small or negligible levels. These measures would also minimize or avoid any foreseeable impacts on groundwater-dependent species or their habitat from any necessary future transmission ROW developments or upgrades for these SEZs. Impacts can be better quantified for specific projects through the identification of water needs and the application of a regional groundwater model.

Design Features and Applicable Avoidance and Minimization Measures

Programmatic design features that would be required of all solar energy projects to reduce ecological impacts under the proposed program are listed in Section 2.2. For solar energy development within the Amargosa and Dry Lake SEZs, required design features that would reduce the potential for impact on groundwater-dependent species would focus on avoiding or minimizing water withdrawals. Applicable avoidance and minimization measures for groundwater-dependent species include the following:

- A Water Resources Mitigation and Monitoring Plan will be developed for each project. Changes in surface water or groundwater quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) or flow that result in the alteration of terrestrial plant communities or communities in wetlands, springs, seeps, intermittent streams, perennial streams, and riparian areas (including the alteration of cover and community structure, species composition, and diversity) off the project site will be avoided to the extent practicable. A monitoring plan will be developed that determines the effects of groundwater withdrawals on plant communities.

- The BLM will require applicants to implement conservation measures to offset the effects of groundwater withdrawal on groundwater-dependent species and their habitats. Any withdrawal of groundwater will be conducted using an amount that offsets any loss of irrigation return flows due to the change in use (e.g., agricultural to industrial) and any probable increase in actual groundwater pumping due to less than full utilization of the rights converted for the project. Annual consumptive groundwater use within basins that support groundwater-dependent species (and those that provide significant underflow to those basins) will not increase over current levels as a result of future solar projects (e.g., due to a loss of irrigation return flows and/or the full utilization of groundwater rights that have not been historically fully utilized). This may be accomplished through the purchase and relinquishment of existing groundwater rights.

- Future solar projects will not result in points of groundwater withdrawal being moved closer to locations that support groundwater-dependent species and/or increased pumping in the regional carbonate aquifer in areas with a significant potential to affect habitat for those species (albeit the total consumptive groundwater use may remain the same).

Effect Determination

With the implementation of all required design features and avoidance and minimization measures to conserve groundwater resources identified above and in Section 2.2, solar energy development in the SEZs may affect, but is not likely to adversely affect, groundwater-dependent

species. An evaluation of water requirements for each development will be made at the project level. Should a future project be determined to have the potential to affect listed groundwater-dependent species, additional NEPA evaluation and documentation and consultation with the Service will be required.

The 17 species considered to be groundwater-dependent are discussed below.

5.2.5.1 Plants

Amargosa Niterwort

The Amargosa niterwort is a perennial forb that is listed as endangered under the ESA and is known only from the Amargosa Valley in Inyo County, California, and Nye County, Nevada. The nearest known occurrences are approximately 25 mi (40 km) southeast of the Amargosa Valley SEZ in the Ash Meadows NWR, where it occurs in playas and alkaline wetlands. Designated critical habitat for this species occurs within an area of 1,215 acres (5 km^2) to the southwest of the Ash Meadows NWR in Inyo County, California, approximately 25 mi (40 km) southeast of the Amargosa Valley SEZ.

Ash Meadows Blazingstar

The Ash Meadows blazingstar is an annual forb that is listed as threatened under the ESA and is known only from the Ash Meadows region in Nye County, Nevada. It is narrowly confined to spring-fed desert wetlands. The nearest known occurrences are approximately 20 mi (32 km) southeast of the Amargosa Valley SEZ. Designated critical habitat for this species occurs in various spring habitats within an area of 1,240 acres (5 km^2) in the Ash Meadows NWR, about 25 mi (40 km) southeast of the Amargosa Valley SEZ.

Ash Meadows Gumplant

The Ash Meadows gumplant is a perennial forb that is listed as threatened under the ESA and is known only from the Ash Meadows region of Inyo County, California, and Nye County, Nevada. It is restricted to saltgrass meadows along spring-fed streams and pools, where it is dependent upon a constant water supply. The nearest known occurrences are from the Ash Meadows NWR, approximately 22 mi (35 km) southeast of the Amargosa Valley SEZ. Designated critical habitat for this species occurs in various spring-fed habitats encompassing a total area of 2,098 acres (8.5 km^2) within the Ash Meadows NWR and in other portions of the Ash Meadows region in Inyo County, California, and Nye County, Nevada, as near as 23 mi southeast of the Amargosa Valley SEZ.

Ash Meadows Ivesia

The Ash Meadows ivesia is a perennial forb that is listed as threatened under the ESA and is known only from the Ash Meadows region in Nye County, Nevada. The species is narrowly endemic to a single spring-fed wetland area with extremely saline soils where only nine extant occurrences are known. The nearest known occurrence is from the Ash Meadows NWR, approximately 20 mi (32 km) southeast of the Amargosa Valley SEZ. Designated critical habitat for this species occurs in various habitats within a total area of 880 acres (3.5 km^2) in the Ash Meadows NWR, between 20 and 25 mi (32 and 40 km) southeast of the Amargosa Valley SEZ.

Ash Meadows Milkvetch

The Ash Meadows milkvetch is a perennial forb that is listed as threatened under the ESA and is known only from the Ash Meadows region in Nye County, Nevada. The species is confined to seasonally moist flats, washes, and knolls of alkaline soils. The nearest known occurrence is from the Ash Meadows NWR, approximately 20 mi (32 km) southeast of the Amargosa Valley SEZ. Designated critical habitat for this species occurs in various habitats within a total area of 880 acres (3.5 km^2) in the Ash Meadows NWR, between 20 and 25 mi (32 and 40 km) southeast of the Amargosa Valley SEZ.

Ash Meadows Sunray

The Ash Meadows sunray is a perennial forb that is listed as threatened under the ESA and is narrowly endemic to saline soils near springs and dry washes in the Ash Meadows region. The nearest known occurrence is from the Ash Meadows NWR, approximately 20 mi (32 km) southeast of the Amargosa Valley SEZ. Designated critical habitat for this species occurs in various habitats within a total area of 1,760 acres (7 km^2) in the Ash Meadows NWR, between 20 and 25 mi (32 and 40 km) southeast of the Amargosa SEZ.

Spring-Loving Centaury

The spring-loving centaury is an annual forb that is listed as threatened under the ESA and is restricted to moist clay soils along the banks of streams and seeps in the Ash Meadows region. The nearest known occurrence of this species is from the Ash Meadows NWR, approximately 20 mi (32 km) southeast of the Amargosa Valley SEZ. Designated critical habitat for this species occurs in various habitats within a total area of 1,840 acres (7.5 km^2) in the Ash Meadows NWR, between 20 and 25 mi (32 and 40 km) southeast of the Amargosa Valley SEZ.

5.2.5.2 Invertebrates

Ash Meadows Naucorid

The Ash Meadows naucorid is a small aquatic insect that is listed as threatened under the ESA and is restricted to Point of Rocks and Kings Springs in the Ash Meadows NWR, where it inhabits gravel bottoms of the swift-flowing hot springs. The nearest known occurrences of this species are approximately 25 mi (40 km) southeast of the Amargosa Valley SEZ. Designated critical habitat for this species occurs in various habitats within a total area of 650 acres (2.5 km^2) in the Ash Meadows NWR, approximately 25 mi (40 km) southeast of the Amargosa Valley SEZ.

5.2.5.3 Fish

Ash Meadows Amargosa Pupfish

The Ash Meadows Amargosa pupfish is a small fish species that is listed as endangered under the ESA and is endemic to the outflow of warm springs in the Ash Meadows region. The nearest known occurrences are from the Ash Meadows NWR, approximately 20 mi (32 km) southeast of the Amargosa Valley SEZ. Designated critical habitat for this species occurs in various spring habitats within an area of 5,123 acres (21 km^2) in the Ash Meadows NWR, approximately 25 mi (40 km) southeast of the Amargosa Valley SEZ.

Ash Meadows Speckled Dace

The Ash Meadows speckled dace is a small fish species that is listed as endangered under the ESA and is endemic to the outflow of warm springs in the Ash Meadows region. The nearest known occurrences are from the Ash Meadows NWR, approximately 20 mi (32 km) southeast of the Amargosa Valley SEZ. Designated critical habitat for this species occurs in various spring habitats within an area of 1,971 acres (8 km^2) in the Ash Meadows NWR, approximately 25 mi (40 km) southeast of the Amargosa Valley SEZ.

Devils Hole Pupfish

The Devils Hole pupfish is a small fish species that is listed as endangered under the ESA and is endemic to Devils Hole, a cavernous aquifer-fed pool in the Ash Meadows NWR. The single natural occurrence of this species is approximately 24 mi (38 km) southeast of the Amargosa Valley SEZ. Critical habitat has not been designated for this species, but the only known occurrence in Devils Hole is protected and access to the site is limited.

Hiko White River Springfish

The Hiko White River springfish is a small fish listed as endangered under the ESA. This species is endemic to Lincoln and Mineral Counties, Nevada, where it is restricted to the remaining waters of the White River and outflow habitats of Hiko and Crystal Springs. This species has also been introduced into Blue Link Spring. The Hiko White River springfish is one of two subspecies of White River springfish that naturally occurred in Pahranagat Valley. Very little information is available on the life history and habitat requirements of the Hiko White River springfish, but the life history of this species is presumably similar to that of other springfish species (genus *Crenichthys*). The Hiko White River springfish is known to occur in the Hiko and Crystal Springs in Pahranagat Valley, approximately 25 mi (40 km) west of the Dry Lake Valley North SEZ. These locations are also sites of designated critical habitat for this species.

Moapa Dace

The Moapa dace is a small fish listed as endangered under the ESA. This species is endemic to the Muddy (Moapa) River and associated thermal spring systems within the Warm Springs Area of Clark County, Nevada. Historically, the Moapa dace inhabited 25 springs and approximately 10 mi (16 km) of the upper Muddy River system. Currently, the species is restricted to 3 springs and less than 6 mi (10 km) of the Muddy River system. Preferred habitats include spring pools, outflows, and the mainstem of the Muddy River, where water is clear and warm. Habitat use varies with age—juveniles tend to occur in spring pools and outflows, while adults tend to occur in outflows and in the Muddy River. This species is known to occur in spring habitats of the Warm Springs Area, approximately 15 mi (24 km) north of the Dry Lake SEZ. Critical habitat for this species has not been designated.

Pahranagat Roundtail Chub

The Pahranagat roundtail chub is a small fish listed as endangered under the ESA. This species is endemic to the White River system in the Pahranagat Valley, Nevada. The historic range of this species likely included about 18.6 mi (29.8 km) of streams in Pahranagat Valley, including outflows from Hiko, Crystal, and Ash Springs, Pahranagat Creek, Pahranagat Lake, and Maynard Lake. This species is omnivorous, feeding mostly on aquatic insects. Within the aquatic habitats, roundtail chubs are often associated with areas of cover in the form of boulders, overhanging cliffs, undercut banks, or vegetation. The Pahranagat roundtail chub is known to occur in Pahranagat Creek, approximately 26 mi (42 km) west by southwest of the Dry Lake Valley North SEZ. Critical habitat for this species has not been designated.

Pahrump Poolfish

The Pahrump poolfish is a small fish listed as endangered under the ESA. This species is endemic to the Pahrump Valley in southern Nye County, Nevada. Natural populations of this

species have been extirpated, but introduced populations exist in three spring-fed habitats in Clark and White Pine Counties, Nevada: Corn Creek Springs (Desert NWR), Shoshone Springs, and an irrigation reservoir fed by Sandstone Spring (Spring Mountain State Park). The introduced population in Corn Creek Springs is located approximately 23 mi (37 km) west of the Dry Lake SEZ. This habitat is about 5 acres (<0.1 km^2) in size and represents the only available potentially suitable habitat for this species within 50 mi (80 km) of the Dry Lake SEZ. Critical habitat for this species has not been designated.

Warm Springs Amargosa Pupfish

The Warm Springs Amargosa pupfish is a small fish species that is listed as endangered under the ESA and is endemic to the outflow of Lovell's Spring and at 5 additional spring flows within 1 mi (1.6 km) of Lovell's Spring in the Ash Meadows NWR. The nearest known occurrences are approximately 22 mi (35 km) southeast of the Amargosa Valley SEZ. Critical habitat has not been designated for this species, but the only known occurrences for this species are located in the Ash Meadows NWR.

White River Springfish

The White River springfish is a small fish species that is listed as endangered under the ESA and is endemic to thermal pools and outflows created by Ash Springs in the Pahranagat Valley, Lincoln County, Nevada. The locations of Ash Springs and its outflow habitats are approximately 26 mi (42 km) west by southwest of the Dry Lake Valley North SEZ. Critical habitat for this species has not been designated. These locations are also sites of designated critical habitat for the White River springfish.

6 POTENTIAL IMPACTS OF TRANSMISSION LINES ON LISTED SPECIES

6.1 BACKGROUND AND METHODOLOGY

One consideration in selecting the locations for the proposed SEZs was proximity to either existing transmission lines or to designated corridors, in order to facilitate access to the regional transmission grid for these locations. Thus, many of the proposed SEZs are adjacent to (or within 1 mi [1.6 km] of) existing transmission lines or designated corridors. However, 7 of the 17 SEZs currently being evaluated are between 2 and 42 mi (3.2 and 67.6 km) from an existing transmission line. Construction of transmission lines to tie solar energy facilities in these SEZs into the main power grid would be required, resulting in land disturbance and potential impact to habitats and specially designated species.

The location of the tie-in to the transmission grid could be the nearest existing transmission line, if that line had a high enough capacity and sufficient uncommitted capacity to accept the power from the SEZ (or was available to be upgraded to sufficient capacity). In the Draft Solar PEIS the environmental impact analyses for the SEZs without adjacent transmission lines included an assessment of the minimum land disturbance that could occur to provide a transmission tie-in for those SEZs, assuming that a tie-line would be constructed to the nearest existing transmission line. No tie-line construction or land disturbance was evaluated for SEZs that had an existing transmission line within or adjacent to (up to 1 mi [1.6 km] from) the SEZ, assuming that the adjacent line would be used as the tie-line to the transmission grid. Evaluation of the available transmission capacity of the nearest existing lines was considered beyond the scope of the analysis (because the required magnitude of such upgrades was unknown, the upgrades would not be controlled by the solar facility developers, and the upgrades might not be solely for the solar facilities within the SEZs). The results of this minimum land disturbance evaluation for the SEZs are summarized in Section 6.2.

For the Final PEIS, changes have been made to the Draft PEIS analyses to test the assumption that no capacity for SEZ-generated power will be available on existing transmission lines in the future. The new analyses identify the most likely load center or load centers for generation sources in SEZs, and provide an upper-bound estimate of land disturbance that would be caused by construction of all new transmission lines from the SEZs to the load centers. This information helped the BLM refine its impact analysis per the requirements of NEPA. The results of these upper-bound analyses are summarized in Section 6.3 below. As described, there are inherent limitations for how this additional transmission analysis could be used to inform the determination of potential impacts on specific listed species or habitats.

6.2 SUMMARY OF RESULTS OF DRAFT PEIS IMPACT ANALYSIS FOR TIE-LINE TRANSMISSION CONSTRUCTION

For the seven SEZs without adjacent existing transmission lines, an assessment was made of the impacts that would be associated with construction of a tie-line to the nearest existing transmission line with a capacity of 69 kV or more. Although the specific location for such tie-

lines was unknown, for the purposes of the analysis it was assumed that the line would be constructed along the nearest straight-line route from the SEZ to the existing transmission line. The following additional assumptions were used for the impact analysis:

- The newly constructed line would be a 230-kV transmission line constructed to the nearest existing transmission line and delivered as alternating current (AC);
- The corridor ROW width would be up to 250 ft (76 m) (including areas disturbed during construction, and conservatively assuming that the disturbed area is doubled during construction);
- The 250-ft (76.2-m) ROW would result in approximately 30 acres (0.12 km^2) of land disturbance per 1 mi (1.6 km) of transmission line construction;
- The ROWs were assumed to be located within a 1-mi-wide (0.6-km-wide) corridor, and no specific location within the corridor was assumed for construction; and
- If more than one project would be built within an SEZ, transmission lines were assumed to be shared between projects.

6.2.1 SEZs with Assumed Transmission Corridors

As stated above, seven proposed SEZs were assumed to definitely need additional transmission infrastructure outside of the SEZ to support solar energy development within the SEZ (it was acknowledged that the other SEZs might also require additional infrastructure, but no analysis was conducted because there was no basis for assuming the location or amount of construction that would be needed). The seven proposed SEZs included Brenda in Arizona; Antonito Southeast and Fourmile East in Colorado; Gold Point in Nevada; and Escalante Valley, Milford Flats South, and Wah Wah Valley in Utah. The distance to and capacity of the nearest existing transmission line assumed in Draft PEIS analyses for each of these SEZs is provided in Table 6.2-1. The remaining 10 SEZs are situated within 1 mi (1.6 km) of a transmission ROW or intersect a transmission ROW that might be suitable to support solar energy development.

6.2.2 Impacts Associated with Transmission Development

Potentially suitable habitats for special status species occur within the assumed transmission tie-line ROWs and corridors for the seven potentially affected SEZs. Construction of transmission ROWs has the potential to directly and indirectly affect listed species and their habitats. As shown in Table 6.2-2, three species that are listed under the ESA may be affected by transmission ROW construction to facilitate solar energy development on the SEZs. These species are the Mexican spotted owl (Antonito Southeast), southwestern willow flycatcher (Antonito Southeast), and Utah prairie dog (Milford Flats South and Wah Wah Valley).

TABLE 6.2-1 Proximity and Capacity of Nearest Existing Transmission for SEZs Assumed in the Draft Solar PEIS to Require Additional Transmission ROW Construction

SEZ	Proximity to Nearest ROW (mi)[a]	Transmission Rating (kV)
Arizona		
Brenda	19	500
Colorado		
Antonito Southeast	4	69
Fourmile East	2	69
Nevada		
Gold Point	22	120
Utah		
Escalante Valley	3	138
Milford Flats South	19	345
Wah Wah Valley	42	138

[a] On the basis of updated data, it appears that the nearest transmission lines for the Brenda, Antonito Southeast, and Gold Point SEZs are actually 12 mi, 2 mi, and 3 mi from the SEZs, respectively. The analyses done in the Draft Solar PEIS for longer distances were overestimates of likely land disturbance and associated impacts. To convert mi to km, multiply by 1.6.

Construction of the transmission ROWs could affect these species and their habitats; however, the implementation of required programmatic design features could minimize these impacts to negligible levels if suitable habitats were not disturbed. Impacts of transmission ROW construction and maintenance have been incorporated in the overall impact discussion for these species in Section 5.2. No critical habitats are designated for any ESA-listed species that may be affected by the assumed transmission ROW developments for these seven SEZs.

6.3 UPPER-BOUND TRANSMISSION IMPACT ASSESSMENT

As stated above, new analyses were conducted subsequent to the Draft Solar PEIS to estimate an upper-bound land disturbance that could be associated with transmission line construction for each of the SEZs. This analysis illustrates the upper-bound impacts by assuming that no capacity for SEZ-generated power will be available on existing transmission lines.

TABLE 6.2-2 Solar Energy Zones with Assumed Transmission Corridors and Impacts on Species Listed under the Endangered Species Act That May Occur in the Assumed Transmission Corridors

Common Name	Scientific Name	ROW Direct Effects[a]	ROW Indirect Effects[b]	Potential for Effect[c]
Arizona SEZs				
Brenda				
There are no ESA-listed species evaluated in this BA that could occur in the Brenda affected area.				Not applicable.
Colorado SEZs				
Antonito Southeast				
Mexican spotted owl	*Strix occidentalis lucida*	3 acres[d] of potentially suitable habitat lost	250 acres of potentially suitable habitat	Small potential for effect; implementation of design features could eliminate impacts.
Southwestern willow flycatcher	*Empidonax traillii extimus*	34 acres of potentially suitable habitat lost	3,100 acres of potentially suitable habitat	Small potential for effect; implementation of design features could eliminate impacts.
Fourmile East (2-mi[e]-long corridor)				
Southwestern willow flycatcher	*Empidonax traillii extimus*	0 acres	0 acres	No effect.
Nevada SEZs				
Gold Point				
There are no ESA-listed species evaluated in this BA that could occur in the Gold Point affected area.				Not applicable.
Utah SEZs				
Escalante Valley				
Utah prairie dog	*Cynomys parvidens*	0 acres	0 acres	No effect.

TABLE 6.2-2 (Cont.)

Common Name	Scientific Name	ROW Direct Effects[a]	ROW Indirect Effects[b]	Potential for Effect[c]
Utah SEZs (Cont.)				
Milford Flats South				
Utah prairie dog	*Cynomys parvidens*	11 acres of potentially suitable habitat lost	1,000 acres of potentially suitable habitat	Potential for effect; implementation of design features could reduce or mitigate impacts.
Wah Wah Valley				
Utah prairie dog	*Cynomys parvidens*	31 acres of potentially suitable habitat lost	2,850 acres of potentially suitable habitat	Potential for effect; implementation of design features could reduce or mitigate impacts.

[a] Direct effects consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with ROW construction, operations, and maintenance. For transmission development, direct effects were estimated within a 250-ft (76-m) wide transmission ROW from the SEZ to the nearest existing line. Direct impacts within this area were determined from the proportion of potentially suitable habitat within the 1-mi (1.6-km) wide transmission corridor.

[b] Area of indirect effects was assumed to be the portion of the transmission corridor where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from project developments. The potential degree of indirect effects would decrease with increasing distance away from the SEZ and transmission ROW.

[c] Required programmatic design features are presented in Section 2.2. The potential for impacts to species was evaluated and included in the overall impact discussion presented in Section 5.2.

[d] To convert acres to km^2, multiply by 0.004047.

[e] To convert mi to km, multiply by 1.6.

The new analyses identify the most likely load center or load centers for generation sources in SEZs on the basis of net present value, and provide an estimate of land disturbance that would be caused by construction of all new transmission lines from the SEZs to the load centers. This information helped the BLM refine its impact analysis per the requirements of NEPA. Specific locations for the new transmission lines were not determined, although the BLM expects that the lines would follow the routes of existing lines in order to minimize land disturbance and make use of existing corridors.

The results of the analysis are presented in Table 6.3-1. The estimated land disturbance for construction of new transmission lines to load centers ranges from 669 acres (2.7 km^2) for the Dry Lake SEZ in Nevada to 717,300 acres (2,900 km^2) for the Riverside East SEZ in California. Since the locations of these hypothetical lines were only generally indicated for these analyses, it was not possible to conduct species-specific impact analyses for these upper-bound transmission impact assessments. Such species-specific impact analyses would be done in preparation for actual transmission line construction if and when specific plans and routing information were available.

TABLE 6.3-1 Upper-Bound Land Disturbance Estimates Associated with Potential Transmission Facility Construction for the SEZs

Solar Energy Zone (SEZ)	Destination for Power[a]	Total Distance (mi)[b]	Number of Substations	Land Disturbance (acres)[c,d]
Arizona				
Brenda	Phoenix, Arizona	120	3	2,242
Gillespie	Phoenix, Arizona	64	2	2,237
California				
Imperial East	Yuma, Arizona; and El Centro and San Diego, California	183	6	3,317
Riverside East[e]	Riverside County, San Diego, Los Angeles, San Francisco, and Sacramento, California; Reno and Las Vegas, Nevada; Yuma, Phoenix, and Tucson, Arizona; Las Cruces, Albuquerque, and Farmington, New Mexico; Denver, Colorado; Salt Lake City, Utah; and El Paso, Dallas, Austin, and San Antonio, Texas	4,264	31	717,300

TABLE 6.3-1 (Cont.)

Solar Energy Zone (SEZ)	Destination for Power[a]	Total Distance (mi)[b]	Number of Substations	Land Disturbance (acres)[c,d]
Colorado				
Antonito Southeast	Pueblo, Colorado Springs, and Denver, Colorado	263	4	6,092
De Tilla Gulch	Colorado Springs, Colorado	140	4	1,370
Fourmile East	Pueblo, Colorado Springs, and Denver, Colorado	211	4	3,761
Los Mogotes East	Pueblo, Colorado Springs, and Denver, Colorado	244	4	4,461
Nevada				
Amargosa Valley	Las Vegas, Nevada; and Los Angeles, California	389	3	8,284
Dry Lake	Las Vegas, Nevada	31	3	669
Dry Lake Valley North	Los Angeles, California	400	4	9,986
Gold Point	Las Vegas, Nevada	169	2	3,600
Millers	Los Angeles, California	324	3	8,709
New Mexico				
Afton	Tucson, and Phoenix Arizona; Las Vegas, Nevada; Riverside County and San Bernardino County, California; El Paso, Texas; Las Cruces, Albuquerque, and Farmington, New Mexico; and Salt Lake City, Utah	1,876	16	35,469
Utah				
Escalante Valley	St. George, Utah; Las Vegas, Nevada; and San Bernardino-Riverside County, California	422	6	5,948
Milford Flats	St. George, Utah; and Las Vegas, Nevada	262	5	5,282
Wah Wah Valley	Las Vegas, Nevada	226	4	4,852

Footnotes on next page.

TABLE 6.3-1 (Cont.)

[a] The description of method to identify most likely load centers for the SEZs is given in Section G.4 of the Final PEIS; the analyses are provided in the SEZ sections in Chapters 8 through 13. Optimal load centers (on the basis of net present value) are presented. Load centers were assumed to accept a maximum of 20% of their total power demand from solar sources.

[b] To convert mi to km, multiply by 1.6.

[c] Land disturbance is a function of size of the SEZ (which determines amount of power potentially generated to be transmitted), distances to load centers, and power demands of load centers. All new transmission lines were assumed to be constructed to carry the loads from each SEZ; the new transmission lines were assumed to be routed adjacent to existing lines. Land disturbance was estimated assuming a ROW width of 200 ft (60 m). Land disturbance for substations was assumed to be 950 ft^2 (88.3 m^2) per megavolt-ampere (MVA).

[d] To convert acres to km^2, multiply by 0.004047.

[e] The assumed maximum build-out of the Riverside East SEZ is very large, such that under the conservative assumptions of this upper-bound analysis, many load centers were required in order to accommodate the entire hypothetical power generation capacity of the SEZ.

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7 CUMULATIVE EFFECTS

For purposes of the ESA, cumulative effects are those effects of future private, state, or Tribal activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation (50 CFR 402.02). This definition applies only to Section 7 analyses and would not be confused with the broader use of this term in NEPA or other environmental laws.

The discussion of cumulative effects in this section describes the effects of the proposed action in the context of other activities that also could affect species listed under the ESA (or those species proposed or candidates for listing). Past and existing threats to species are presented in the individual species discussions in Section 5.2. For BLM-administered lands within the six-state action area, actions that are reasonably certain to occur are described in existing land use plans. Future solar energy development activities are expected to occur in addition to current land use practices and other developments on BLM lands and in adjacent areas that may be private or state owned. Individual solar projects on BLM lands would include a comprehensive, ongoing environmental monitoring component to evaluate environmental conditions and adjust activities as necessary. As a result, the BLM's Solar Energy Program would be expected to continue to provide needed protection over time, consistent with an adaptive approach.

Cumulative effects on species that would result from the construction, operation, and decommissioning of solar energy development projects, when added to other future actions that are reasonably certain to occur, are discussed below. Although the locations and sizes of specific state or private activities, not involving federal activities, are not known, on the basis of the reasonably foreseeable development scenario (RFDS) developed for the PEIS, it was assumed that overall solar development in the 6-state action area would be approximately 24,000 MW on BLM-administered lands, with an additional 8,000 MW on non-BLM-administered lands. This level of development would require a corresponding dedicated use of about 214,000 acres (866 km^2) of BLM-administered lands and 71,000 acres (287 km^2) of non-BLM-administered lands. Because of the uncertain nature of future projects in terms of size, number, location, and the types of technology that would be employed, the impacts can only be discussed qualitatively. For those federal projects requiring formal consultation, more detailed analyses would be performed to determine the cumulative effects of future projects in the relevant geographic area.

A number of federal activities are either planned or currently under way in the vicinity of each of the individual SEZs. Some of these activities include BLM land use plan amendments, fast-track solar energy projects, transmission ROW development, and other renewable energy development. These federal activities have been or would be considered under separate Section 7 consultations with the Service and are not included in the cumulative effects discussion in this BA. Because of the geographic locations of the proposed SEZs, the private, state, and Tribal activities most likely to contribute to cumulative effects on ESA-listed species include factors such as urban development, agriculture, water use, and climate change (Table 7-1).

TABLE 7-1 General Trends in the Six-State Study Area

General Trend	Associated Activities
Increased population growth	Agricultural, residential, commercial, and industrial property development adjacent to federal land Urbanization Roads and traffic Land use modification Employment Resource use (e.g., water)
Increased energy demand	Resource use Energy development Energy transmission and distribution
Increased water demand	Resource use
Climate change	Water cycle changes Wildland fires Habitat changes

The West is the fastest growing region in the United States. Between 1990 and 2000, it grew at a faster rate (19.7%) than the nation as a whole (13.2%). Four states within the action area had population increases greater than 25% in the 10-year period, with Nevada growing by more than 66%. The West is also the most urbanized of the four U.S. regions, with more than 88% of the population living in urban areas in 2000. In 2000, the percentages of populations living in urban areas in five of the six states in the action area were above the national average of 79%, with the highest being California (at 94.4%) (BLM 2004).

The increasing human population in the action area could result in increased private and state activities that could affect listed species. Livestock grazing and other agricultural practices on private lands adjacent to public lands would contribute to cumulative effects by reducing habitat quality and quantity in areas near solar energy projects on BLM lands. The full extent of these effects cannot be determined because of the lack of specific proposals or plans.

Water demand in the six-state region is expected to increase to meet the demands of a growing human population. The USGS defines eight categories of water use in the United States: public supply, domestic, irrigation, livestock, aquaculture, industrial, mining, and thermoelectric power. Water utilization in the western United States includes surface and groundwater sources, with surface water contributing nearly 80% of water withdrawals (Kenny et al. 2009). Increased water withdrawals from concurrent state, private, and Tribal activities could affect listed species through the alteration of water tables and natural hydrologic processes. Species that could be affected by water withdrawals are species with habitats that are dependent upon surface or groundwater resources, such as wetlands, riparian habitats, streams and rivers, springs, and playas.

There is a growing consensus in the scientific community that human activity is contributing substantially to the increase in the Earth's surface temperature (USGCRP 2009). The phenomenon is very likely due to human-generated increases in greenhouse gas (GHG) concentrations. GHGs include water vapor, carbon dioxide, methane, ozone, nitrous oxide, and several fluorine- and chlorine-containing gases. Of these gases, carbon dioxide is believed to be contributing the most to recent warming. In the atmosphere, GHGs trap heat that would otherwise escape into space, creating a "greenhouse effect." Since the inception of the industrial era, the burning of fossil fuels and clearing of forests have greatly intensified the natural greenhouse effect, causing global average temperatures to rise at a fast rate; for example, in the United States, average temperatures have risen at a rate of nearly 0.6°F (0.3°C) per decade in the past few decades (NSTC 2008). Increasing temperatures and changes in precipitation patterns may affect listed species by affecting tolerance thresholds and affecting habitat availability and quality. Researchers with the U.S. Global Change Research Program (USGCRP 2009) predicted that water supplies in the western United States will become scarcer as a result of climate change, thereby exacerbating the water needs of a growing human population. These predictions also suggest that climate change may facilitate invasion of non-native species, drought, and wildfires.

The cumulative effects of these factors on species listed under the ESA cannot be quantified without more specific information on proposed projects and ongoing and future trends in the action area. It is clear, however, that the species considered in this BA are vulnerable to cumulative effects, and that an adaptive management program, as proposed by the BLM in the proposed action, will be essential for avoiding jeopardy.

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APPENDIX A

LEGAL DESCRIPTIONS OF THE SOLAR ENERGY ZONES

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ARIZONA

Below are the legal descriptions for the two proposed SEZ land withdrawal areas in Arizona.

Gila and Salt River Meridian

Brenda SEZ:

T. 4 N., R. 16 W.,
sec. 1, lots 3 and 4, S½NW¼, and SW¼;
secs. 2 to 4 inclusive;
sec. 9, NE¼, NE¼NW¼, and NE¼SE¼;
sec. 10, N½, N½S½, and SW¼SW¼;
sec. 11, NW¼.

T. 5 N., R. 15 W.,
sec. 31, lots 1 to 4, inclusive, E½NW¼, and E½SW¼.

The areas described aggregate approximately 3,349 acres (13.55 km^2).

Gillespie SEZ:

T. 2 S., R. 6 W.,
sec. 6, SW¼, W½SE¼, and SE¼SE¼, unsurveyed;
sec. 7, N½, NE¼SW¼, N½SE¼, and SE¼SE¼, unsurveyed;
sec. 8, SE¼NW¼, W½NW¼, SW¼, S½SE¼, and NW¼SE¼, unsurveyed;
sec. 9, SW¼SW¼, unsurveyed;
sec. 15, NW¼SW¼, N½SW¼SW¼, SE¼SW¼, and S½SW¼SE¼, unsurveyed;
sec. 16, S½NE¼, S½NW¼NE¼, NW¼, and N½NE¼SE¼, unsurveyed;
sec. 17, N½NE¼, N½SE¼NE¼, NE¼NW¼, and N½NW¼NW¼, unsurveyed;
sec. 22, S½NE¼NE¼, NW¼NE¼, N½SW¼NE¼, SE¼NE¼, and N½NE¼NW¼, unsurveyed;
sec. 23, SW¼NW¼, N½SW¼, SE¼SW¼, S½NE¼SE¼, NW¼SE¼, and S½SE¼, unsurveyed;
sec. 24, S½NW¼SW¼ and S½SW¼, unsurveyed.

T. 2 S., R. 7 W.,
sec. 1, SE¼SW¼, NE¼SE¼, and S½SE¼;
sec. 12, N½NE¼, SE¼NE¼, and NE¼NW¼.
sec. 23, SW¼NW¼, N½SW¼, SE¼SW¼, S½NE¼SE¼, NW¼SE¼, and S½SE¼, unsurveyed;
sec. 24, S½NW¼SW¼ and S½SW¼, unsurveyed.

T. 2 S., R. 7 W.,
sec. 1, SE¼SW¼, NE¼SE¼, and S½SE¼;
sec. 12, N½NE¼, SE¼NE¼, and NE¼NW¼.

The areas described aggregate approximately 2,607 acres (10.55 km^2).

CALIFORNIA

Below are the legal descriptions for the two proposed SEZ land withdrawal areas in California, as presented in the Draft Solar PEIS.

San Bernardino Meridian

Imperial East SEZ:

T. 16 S., R. 17 E.,
- sec. 21, that portion lying 120 ft south of the centerline of Interstate 8 and east of Lake Cahuilla No. 5 ACEC;
- secs. 22 to 25, inclusive, those portions lying 120 ft south of the centerline of Interstate 8;
- secs. 26 and 27;
- secs. 28 and 33, those portions lying east of Lake Cahuilla No. 5 ACEC;
- secs. 34 and 35.

T. 16 S., R. 18 E.,
- secs. 29 and 30, those portions lying 120 ft south of the centerline of Interstate 8;
- sec. 31, lot 3, NE¼, NE¼NW¼, SE¼SW¼, and S½SE¼;
- sec. 32, that portion of the N½N½ lying 120 ft south of the centerline of Interstate 8, S½NW¼SW¼, and S½S½;
- sec. 33, that portion of the N½ lying 120 ft south of the centerline of Interstate 8 and N½SE¼;
- sec. 34, those portions of the N½SW¼ and the NW¼SE¼ lying 120 ft south of the centerline of Interstate 8.

The areas described above aggregate approximately 5,722 acres (23 km^2).

Riverside East SEZ

T. 3 S., R. 15 E.,
- sec. 15, SW¼;
- sec. 21, NE¼NE¼, E½NW¼NE¼, SW¼NE¼, SE¼NE¼, S½SW¼, NE¼SW¼, S½SE¼NW¼, and SE¼;
- sec. 22, SW¼NW¼NE¼, SW¼NE¼, SW¼SE¼NE¼, W½, W½NE¼SE¼, SE¼NE¼SE¼, W½SE¼, and SE¼SE¼;
- sec. 23, W½SW¼SW¼;
- sec. 26, SW¼NE¼NW¼, W½NW¼, SE¼SE¼NW¼, SW¼ excluding lands within Right-of-Way CALA-051571, W½NW¼SE¼, SW¼SE¼ excluding non-public lands and lands within Right-of-Way CALA-051597, and S½SE¼SE¼;
- sec. 27 excluding lands within Right-of-Way CALA-051597;

sec. 28;
sec. 29, E½NE¼, SW¼NE¼, SE¼SE¼NW¼, E½SW¼, SW¼SW¼ excluding non-public lands, and SE¼;
sec. 32, N½, and S½ excluding nonpublic lands and lands within Right-of-Way CALA-051571;
sec. 33, excluding lands within Right-of-Way CALA-051571;
sec. 34, excluding lands within Right-of-Way CALA-051597;
sec. 35, excluding lands within Right-of-Way CALA-052057 and CALA-051206.

T. 4 S., R. 15 E.,
sec. 1, excluding lands within Joshua Tree National Park;
secs. 2 and 3, excluding lands within Right-of-Way CALA-051206;
sec. 4, excluding non-public lands;
sec. 5, excluding non-public lands and lands within Right-of-Way CALA-051571;
sec. 8, excluding lands within Right-of-Way CALA-051571;
sec. 9, excluding lands within Right-of-Way CALA-051206;
sec. 10, excluding lands within Right-of-Way CALA-051206;
secs. 11 and 12;
sec. 13, excluding non-public lands;
secs. 14 and 15;
sec. 17, that portion situated north of Right-of-Way CALA-051206 and north and east of Right-of-Way CALA-051571;
sec. 21, that portion situated north of Right-of-Way CALA-0149780;
secs. 22, 23, and 24;
sec. 25, N½N½, SW¼NE¼, S½NW¼, SW¼ excluding non-public lands, W½SE¼, and SE¼SE¼;
sec. 26, N½, S½SW¼SW¼, SW¼SE¼SW¼, NE¼SE¼, NE¼NW¼SE¼, and NE¼SE¼SE¼;
sec. 27, N½NE¼, N½SE¼NE¼, N½NE¼NW¼, SE¼NE¼SW¼, E½SE¼SW¼, S½SE¼, and S½NW¼SE¼;
sec. 30, lots 1 and 2, W½NE¼, NW¼ unsurveyed, and NW¼SE¼;
sec. 31, N½ of lot 1 in the NW¼ and N½ of lot 2 in the NW¼;
sec. 34, E½ and E½E½W½;
sec. 35, lots 1 and 2, SW¼NE¼NE¼, S½NW¼NE¼, SW¼NE¼, W½SE¼NE¼, SE¼SE¼NE¼, W½, N½SE¼, and SW¼SE¼.

T. 5 S., R. 15 E.,
sec. 3, E½ of lot 1 in the NE¼, E½ lot 2 in the NE¼, and E½SE¼;
sec. 10, E½NE¼ and NE¼SE¼;
sec. 13, S½;
sec. 14, S½;
sec. 15, E½SE¼;
sec. 22, E½NE¼, SW¼, and N½SE¼, excluding nonpublic lands;
sec. 23, N½ and SE¼;
sec. 24, N½, SW¼, E½SE¼, and SW¼SE¼;
sec. 25, N½N½N½;
sec. 27, NW¼NW¼.

T. 3 S., R. 16 E.,
sec. 13;
sec. 14, E½NE¼, SE¼SW¼, and SE¼;
sec. 22, E½SE¼ and SW¼SE¼;
secs. 23 and 24;
sec. 25, excluding non-public lands;
sec. 26, NE¼NE¼.

T. 4 S., R. 16 E.,
sec. 1, excluding lands within Right-of-Way CALA-051207;
sec. 7, lot 3;
sec. 12, excluding lands within Right-of-Way CALA-051207;
sec. 13;
sec. 14, excluding lands within Joshua Tree National Park;
sec. 18, S½ of lot 1 in the NW¼, lot 1 in the E½SW¼, lots 2 and 3, and SW¼SE¼;
sec. 19, excluding non-public lands;
sec. 20, SW¼NW¼, SW¼, W½SE¼, and SE¼SE¼;
sec. 21, SW¼SW¼;
sec. 22, E½SE¼;
sec. 23, excluding lands within Joshua Tree National Park;
secs. 24 and 25;
sec. 26, E½, E½W½, and NW¼NW¼;
sec. 27, N½NE¼;
sec. 28, NW¼, N½SW¼, and SW¼SW¼ excluding lands within Right-of-Way CALA-051221;
sec. 29, N½, W½SW¼, and SE¼;
sec. 30, excluding non-public lands;
sec. 31, lot 3 in the NW¼NW¼, N½ of lot 3 in the SW¼NW¼, and S½ of lot 3 in the SW¼SW¼;
sec. 35;
sec. 36, NE¼, E½NW¼, NE¼SW¼, and S½SE¼.

T. 5 S., R. 16 E.,
secs. 1 and 2;
sec. 3, lots 1 and 2 in the NE¼, lot 1 in the NW¼ excluding nonpublic lands, lot 2 in the NW¼, and SE¼ excluding non-public lands;
sec. 4, N½ of lot 1 in the NE¼ and lot 2 in the NE¼;
sec. 6, lot 1 in the S½NE1/4, S½ of lot 2 in the NE¼NE¼, lot 2 in the NW¼NE¼, and lot 2 in the NW¼;
sec. 8, S½NW¼SW¼ and SW¼SW¼;
sec. 10, N½ excluding nonpublic lands and S½;
sec. 11, N½NE¼, N½SW¼NE¼, SE¼SW¼NE¼, SE¼NE¼, NE¼NW¼, N½NW¼NW¼, SE¼NW¼NW¼, S½SW¼NW¼, SW¼SE¼NW¼, SW¼, S½NW¼SE¼, and S½SE¼;
sec. 12, N½, S½SW¼SW¼, NE¼SE¼, E½NW¼SE¼, NW¼NW¼ SE¼, NW¼SE¼SE¼, and NE¼SW¼SE¼;
sec. 13, S½NE¼, S½N½NE¼, S½NE¼NW¼, SE¼NW¼, W½NW¼, and S½;
sec. 14, E½;

sec. 15, S½;
sec. 17, S½N½ and NW¼NW¼;
sec. 18, lot 1 and 2 in the SW¼ and SE¼;
secs. 19 and 20;
sec. 21, N½;
sec. 22;
sec. 23, E½, E½NW¼, NW¼NW¼, and SW¼;
sec. 24;
sec. 25, W½;
sec. 26;
sec. 27, that portion situated northerly of Right-of-Way CAR-05498;
sec. 28, N½N½N½;
sec. 29, N½N½N½;
sec. 30, N½N½ of lot 1 in the NW¼, N½ of lot 2 in the NW¼, and N½N½NE¼;
sec. 34, those portions of the N½N½N½ situated northerly of Right-of-Way CAR-05498;
sec. 35, N½N½N½.

T. 3 S., R. 17 E.,
sec. 17, excluding the Palen-McCoy Wilderness Area;
secs. 18 and 19;
sec. 20 and 21, excluding the Palen-McCoy Wilderness Area;
sec. 27, SW¼ excluding the Palen-McCoy Wilderness Area;
sec. 28, excluding the Palen-McCoy Wilderness Area;
sec. 29;
sec. 30, lots 1 and 2 in the NW¼, N½ of lots 1 and 2 in the SW¼, NE¼, and N½SE¼;
sec. 31, lot 1 in the E½SW¼ excluding lands within Right-of-Way CAR-06910 and lot 2 in the SW¼ excluding lands within Right-of-Way CAR-06910;
sec. 32, E½, NE¼NW¼, and E½SE¼NW¼;
sec. 33;
sec. 34, excluding the Palen-McCoy Wilderness Area.

T 4 S., R. 17 E.,
sec. 3, excluding the Palen-McCoy Wilderness Area;
sec. 4;
sec. 5, lots 1 and 2 in NE¼, E½SE¼, and E½W½SE¼;
sec. 6, W½ of lots 1 and 2 in the NE¼, W½ of lots 1 and 2 in the NW¼, S½E½ of lot 1 in the NW¼, lots 1 and 2 in the SW¼, and SE¼;
sec. 7;
sec. 8, E½NE¼, E½W½NE¼, and NE¼SE¼;
sec. 9;
sec. 10, excluding the Palen-McCoy Wilderness Area;
sec. 11, excluding the Palen-McCoy Wilderness Area;
sec. 14, excluding the Palen-McCoy Wilderness Area,
sec. 15;
sec. 17, W½SW¼;
secs. 18 and 19;

sec. 20, W½NW¼;
sec. 21, NE¼ and E½SE¼;
sec. 22;
sec. 23, excluding the Palen-McCoy Wilderness Area;
sec. 26, excluding the Palen-McCoy Wilderness Area;
sec. 27;
sec. 28, E½NE¼;
secs. 30 and 31;
sec. 34, E½, E½W½, and E½W½W½;
sec. 35, excluding the Palen-McCoy Wilderness Area.

T. 5 S., R. 17 E.,
sec. 1, excluding the Palen-McCoy Wilderness Area;
sec. 2, excluding the Palen-McCoy Wilderness Area;
sec. 3, E½E½E½;
sec. 5, lots 1 and 2 in the NW¼ and SW¼;
sec. 6;
sec. 7, excluding non-public lands;
sec. 8, W½ and SE¼;
sec. 9, SW¼, W½SE¼, SW¼NE¼SE¼, W½SE¼SE¼, and SE¼SE¼SE¼;
sec. 10, E½E½E½;
sec. 11, excluding the Palen-McCoy Wilderness Area;
sec. 14, excluding the Palen-McCoy Wilderness Area and non-public lands;
sec. 15, NE¼NE¼NE¼, SW¼NW¼SW¼, W½SW¼SW¼, SE¼SW¼SW¼, and S½SE¼SW¼;
sec. 17, excluding non-public lands;
sec. 18, excluding non-public lands;
sec. 19, NE¼, lots 1 and 2 in the NW¼, and lots 1 and 2 in the SW¼;
sec. 20, W½NW¼, SE¼NW¼, and S½;
sec. 21;
sec. 22, SW¼NW¼NE¼, SW¼NE¼, W½, NW¼NE¼SE¼, S½NE¼SE¼, W½SE¼, and SE¼SE¼;
sec. 23, NE¼ excluding the Palen-McCoy Wilderness Area, E½NW¼, E½NE¼SW¼. S½SW¼, and SE¼;
sec. 26, SW¼NW¼ and SW¼;
sec. 27, N½, N½SW¼, SE¼SW¼, and SE¼;
sec. 28;
sec. 29, E½ and SW¼;
secs. 31 to 34 inclusive;
sec. 35, NW¼ excluding non-public lands.

T. 6 S., R. 17 E.,
sec. 1, lots 1 and 2 in the NW¼ and S½;
sec. 2;
sec. 3, excluding non-public lands;
sec. 4, that portion situated northerly of Right-of-Way CAR-05498;
secs. 10, 11, and 12, those portions situated northerly of Right-of-Way CAR-05498.

T. 6 S., R. 18 E.,
secs. 1, 2, 3, and 4 excluding Palen-McCoy Wilderness Area;
sec. 7, lot 1 in the SW¼, lot 2 in the SW¼, and SE¼;
sec. 9;
sec. 10, N½, NE¼SW¼, and N½SE¼;
secs. 11, 12, and 13;
sec. 14, N½, N½S½, and S½SE¼;
sec. 17, that portion situated northerly of Right-of-Way CAR-05498;
sec. 18, those portions of the NE¼ situated northerly of Right-of-Way CAR-05498;
sec. 23, N½NE¼, NE¼NW¼ and that portion of the S½ situated northerly of Right-of-Way CAR-05498;
sec. 24, that portion of the S½ situated northerly of Right-of-Way CAR-05498.

T. 6 S., R. 19 E.,
secs. 3, 4, and 5, excluding the Palen-McCoy Wilderness Area;
sec. 6, N½ excluding the Palen-McCoy Wilderness Area and SE¼;
secs. 7, 8, and 9;
secs. 10, 11, 12, and 13 excluding the Palen-McCoy Wilderness Area;
secs. 14, 15, 17, and 18;
sec. 19, NW¼NE¼, N½ of lots 1 and 2 in the NW¼, S½ of lots 1 and 2 in the SW¼, and SE¼;
secs. 20 to 24, inclusive;
sec. 25, W½;
secs. 26 and 27;
sec. 28, that portion situated northerly of Right-of-Way CALA-0107395;
sec. 29, that portion of the E½ situated northerly of Right-of-Way CALA-0107395;
sec. 33, that portion of the N½ situated northerly of Right-of-Way CALA-0107395;
sec. 34, that portion of the N½ situated northerly of Right-of-Way CALA-0107395;
sec. 35, that portion of the N½ situated northerly of Right-of-Way CALA-0107395.

T. 6 S., R 20 E.,
sec. 3;
sec. 5, S½ excluding the Palen-McCoy Wilderness Area;
sec. 7, excluding the Palen-McCoy Wilderness Area;
sec. 8, excluding the Palen-McCoy Wilderness Area;
secs. 9, 10, and 15;
sec. 16, S½NW¼ and NE¼NW¼;
sec. 17, E½ and NW¼;
sec. 18;
sec. 19, lots 1 and 2 in the SW¼ and W½E½;
sec. 20, W½, E½SE¼, and SW¼SE¼;
sec. 21, E½, W½NW¼, and NE¼NW¼;
sec. 22, N½ and SE¼;
sec. 23, S½;
sec. 24, S½;
sec. 25, N½ and SE¼;
sec. 26;

sec. 27, N½NW¼, SW¼NW¼, and S½;
sec. 28, E½, NE¼SW¼, and S½SW¼;
secs. 29 and 30;
sec. 31, N½ of lot 1 in NW1/4 and N½N½NE¼;
sec. 32, N½N½N½;
sec. 33, N½N½NE¼;
sec. 34, N½N½N½;
sec. 35, NW¼NE¼, N½NW¼, and S½.

T. 7 S., R. 20 E.,
sec. 1, lots 1 and 2 in the NE¼, lots 1 and 2 in the NW¼, and SW¼;
sec. 2, lots 1 and 2 in the NE¼, lots 1 and 2 in the NW¼, and SE¼;
sec. 11, E½NE¼, SW¼NE¼, and S½;
secs. 12, 13, 24, and 25.

T. 4 S., R. 21 E.,
sec. 2, SW¼;
secs. 3 and 4;
sec. 5, E½ of lot 1 in the NE¼, lots 5 to 12, inclusive, and SE¼;
sec. 8, E½;
secs. 9 to 15, inclusive;
secs. 21 to 35, inclusive.

T. 5 S., R. 21 E.,
secs. 1 to 14, inclusive;
sec. 15, S½;
secs. 17 to 23, inclusive;
sec. 24, S½;
secs. 25 to 30, inclusive;
secs. 32 to 35, inclusive.

T. 6 S., R. 21 E.,
Tracts 37 to 47, inclusive;
Tracts 49 to 56, inclusive;
Tracts 58, 59, N½ of 61 and N½ of 62;
Tracts 68, 69, 71, N½ of 73, and 74 to 80, inclusive;
secs. 4, 5, 8, and 9;
sec. 15, lots 1 and 2, SW¼, and W½SE¼;
secs. 19 and 22;
sec. 23, lots 2, 3, 5, and 6, and W½W½;
sec. 26, lot 1;
sec. 27;
sec. 29, N½ and SW¼;
sec. 30;
sec. 31, lots 5, 6, 9, 10, 11, 12, 17, and 18, S½NE¼, and SE¼.
sec. 32, NW¼.

T. 7 S., R. 21 E.,
sec. 2, lots 3, 4, 5, 6, S½N½, E½SW¼, and NW¼SE¼;
sec. 3;
sec. 4, lots 3 and 4, S½NE¼, and S½;
sec. 5, S½S½;
sec. 6, SE¼;
sec. 7;
sec. 8, SW¼;
sec. 9, E½ and SW¼;
sec. 10;
sec. 11, N½ and SW¼;
sec. 12, NW¼ and N½SW¼;
sec. 13;
sec. 14, S½NE¼, NW¼, and S½;
sec. 15, W½ and SE¼;
sec. 17, E½, SE¼NW¼, and SW¼;
sec. 18;
secs. 19, 20, and 21, excluding the Mule Mountains Area of Critical Environmental Concern (ACEC);
sec. 22, N½ and SW¼;
secs. 23 and 24;
sec. 25, S½NW¼ and N½SW¼;
sec. 26, E½;
sec. 27, NW¼ excluding the Mule Mountains ACEC, and S½ excluding the Mule Mountains ACEC;
sec. 28, excluding the Mule Mountains ACEC;
sec. 30, excluding the Mule Mountains ACEC;
sec. 34, excluding the Mule Mountains ACEC;
sec. 35.

T. 4 S., R. 22 E.,
secs. 7, 8, and secs. 17 to 20, inclusive;
secs. 29 to 33, inclusive.

T. 5 S., R. 22 E.,
secs. 2 to 6, inclusive;
sec. 7, lots 1 and 2 in the NW¼ and E½;
secs. 8 to 14, inclusive;
sec. 15, E½;
sec. 17;
sec. 18, NE¼, lots 1 and 2 in the NW¼, and lots 1 and 2 in the SW¼;
secs. 19 and 20;
sec. 21, S½;
secs. 22, 23, and 24;
sec. 25, W½NE¼, NW¼, and N½SW¼;
sec. 26, N½;

sec. 27, N½ and SW¼;
sec. 28, S½;
sec. 29, N½ and SW¼;
sec. 30;
sec. 31, E½;
sec. 32;
sec. 33, SW¼.

T. 6 S., R. 22 E.,
sec. 3, lots 1 and 2 in the NW¼ and SW¼SW¼;
secs. 4 to 7, inclusive;
sec. 8, N½NE¼ and NW¼;
sec. 9, NE¼, N½NW¼, SE¼NW¼, and E½SE¼;
sec. 10, NW¼NW¼;
sec. 18, N½ of lot 1 in the NW¼ and lot 2 in the NW¼.

T. 7 S., R. 22 E.,
sec. 18, lot 4.

The areas described above aggregate approximately 202,896 acres (821 km^2).

COLORADO

Below are the legal descriptions for the four proposed SEZ land withdrawal areas in Colorado.

New Mexico Principal Meridian

Antonito Southeast SEZ:

T. 32 N., R. 9 E.,
sec. 3, lot 4, SW¼NW¼, W½SW¼, SE¼SW¼, SW¼SE¼, and E½SE¼;
secs. 4, 9, 10, and 11;
sec. 12, W½ and SE¼;
secs. 13, 14, 15 and secs 21 to 24 inclusive

T. 32 N., R. 10 E.,
sec. 7, lot 4, SE¼SW¼, and S½SE¼;
sec. 8, S½S½;
sec. 9, SW¼SW¼;
secs. 17 to 20 inclusive;
sec. 21, lots 1 to 4, inclusive, W½NE¼, and NW¼.

The areas described aggregate approximately 10,310 acres (41.72 km^2).

Fourmile East SEZ:

T. 37 N., R. 12 E.,
sec. 2, lots 3 and 4, and S½NW¼;
sec. 3, lots 3 and 4, and S½N½.

T. 38 N., R. 12 E.,
sec. 13, SW¼ and W½SE¼;
sec. 23;
sec. 24, W½ and W½SE¼;
sec. 25, W½NE¼ and W½;
sec. 26;
sec. 35, NW¼.

The areas described aggregate approximately 2,883 acres (11.67 km^2).

Los Mogotes East SEZ:

T. 34 N., R. 8 E.,
sec. 1;
sec. 12;
sec. 13, NE¼NE¼, W½NE¼, W½, and NW¼SE¼;
sec. 24, W½ and W½SE¼;
sec. 25, W½ and W½E½.

The areas described aggregate approximately 2,640 acres (10.68 km^2).

De Tilla Gulch SEZ:

T. 45 N., R. 9 E.,
sec. 29, that portion of the S½ lying one-quarter mile southeasterly and parallel to the centerline of Highway 285;
sec. 30, that portion of the SE¼SE¼ lying one-quarter mile southeasterly and parallel to the centerline of Highway 285;
sec. 31, those portions of the NE¼ and the SE¼NW¼ lying one-quarter mile southeasterly and parallel to the centerline of Highway 285; and those portions of the NE¼SW¼ and the N½SE¼ lying one-quarter mile north of and parallel to the centerline of the Old Spanish National Historic Trail as mapped by the National Park Service;
sec. 32, N½, and that portion of the N½SW¼, lying one-quarter mile north of and parallel to the centerline of the Old Spanish National Historic Trail as mapped by the National Park Service;
sec. 33, N½NE¼ and NW¼.

The areas described aggregate approximately 1,064 acres (4.31 km^2).

NEVADA

Below are the legal descriptions for the five proposed SEZ land withdrawal areas in Nevada.

Mount Diablo Meridian

Amargosa Valley SEZ:

T. 13 S., R. 47 E.,
sec. 35, E½NE¼, SW¼NE¼, NW¼NW¼, S½NW¼, and S½;
sec. 36, that portion south and west of the centerline of I-95.

T. 14 S., R. 47 E.,
sec. 8, E½, unsurveyed;
sec. 9, unsurveyed;
secs. 10, 11, 13, and 14, those portions south and west of the centerline of I-95, unsurveyed.
secs. 15 and 16, unsurveyed;
sec. 21, E½, unsurveyed;
secs. 22 and 23, unsurveyed;
sec. 24, W½E½ and W½, and those portions of the W½NE¼ and W½SE¼ south and west of the centerline of I-95, unsurveyed;
sec. 25, W½NE¼ and W½, unsurveyed;
secs. 26 and 27, unsurveyed;
sec. 34, E½, unsurveyed;
sec. 35, unsurveyed;
sec. 36, W½, unsurveyed.

T. 15 S., R. 47 E.,
sec. 1, W½W½, unsurveyed;
sec. 2, unsurveyed;
sec. 12, NW¼NW¼, unsurveyed.

The areas described aggregate approximately 9,737 acres (39.40 km^2).

Dry Lake SEZ:

T. 17 S., R. 63 E.,
sec. 33, that portion of the S½ north and east of the centerline of Nev 060522;
sec. 34, lots 1 to 4, inclusive, NE¼, S½NW¼, and N½S½;
sec. 35, lots 1 to 4, inclusive, N½, and N½S½;

sec. 36, lots 1 to 4, inclusive, N½, and N½S½.

T. 18 S., R. 63 E.,
secs. 1 to 4, inclusive, and 10;
sec. 11, those portions north and east of the centerline of Nev 060522;
sec. 12;
sec. 13, lots 15 and 16, and that portion of the N½ lying north and west of the westerly right-of-way line of Highway 93;
sec. 14, lot 1.

T. 17 S., R. 64 E.,
sec. 31, lots 5 to 8, inclusive, SW¼NE¼, E½W½, and SE¼;
sec. 32, that portion of the SW¼, lying north and west of the centerline of I-15.

T. 18 S., R. 64 E.,
secs. 6, and 7, those portions lying north and west of the centerline of I-15;

The areas described aggregate approximately 6,186 acres (25.03 km^2).

Dry Lake Valley North SEZ:

T. 1 N., R. 64 E.,
secs. 35 and 36.

T. 1 N., R. 65 E.,
sec. 31;
sec. 32, W½SW¼.

T. 1 S., R. 64 E.,
secs. 1, 12, and 13;
sec. 21, E½ and E½W½;
secs. 22 to 27, inclusive;
sec. 28, E½;
sec. 33, E½E½ and NW¼NE¼;
secs. 34, 35, and 36.

T. 2 S., R. 64 E.,
secs. 1, 2, and 3;
sec. 4, lot 1 and SE¼NE¼;
sec. 10, N½, N½SW¼, SE¼SW¼, and SE¼;
secs. 11 to 14, inclusive;
sec. 15, NE¼, E½NW¼, NE¼SW¼, N½SE¼, and SE¼SE¼;
sec. 23, NE¼, E½NW¼, NW¼NW¼, N½SE¼, and SE¼SE¼;
sec. 24;
sec. 25, N½NE¼.

T. 1 S., R. 65 E.,
sec. 6, lots 3 and 4, and lots 7 to 13, inclusive;
secs. 7, 8, 17 to 20 inclusive, and secs. 29, 30, and 31;
sec. 32, N½, SW¼, and W½SE¼.

T. 2 S., R. 65 E.,
sec. 5, lots 2, 3, and 4, SW¼NE¼, S½NW¼, SW¼, and W½SE¼;
secs. 6 and 7;
sec. 8, W½E½ and W½;
sec. 17, SE¼NE¼, W½NE¼, W½, and SE¼;
secs. 18 and 19;
sec. 20, W½NE¼ and W½;
sec. 29, NW¼, N½SW¼, and SE¼SW¼;
sec. 30, lot 1, NE¼, E½NW¼, and NE¼SE¼.

The areas described aggregate approximately 28,726 acres (116.25 km^2).

Gold Point SEZ:

T. 6 S., R. 41 E.,
sec. 13, S½;
sec. 14, E½SE¼;
sec. 23, E½E½ and NW¼SE¼;
sec. 24;
sec. 25, N½, NE¼SW¼, and N½SE¼;
sec. 26, NE¼NE¼.

T. 6 S., R. 41½ E.,
sec. 13, N½SW¼ and SW¼SW¼, unsurveyed;
sec. 14, S½, unsurveyed;
sec. 15, S½, unsurveyed;
sec. 16, S½, unsurveyed;
secs. 21 and 22, unsurveyed;
sec. 23, N½NE¼, SW¼NE¼, W½, and NW¼SE¼, unsurveyed;
sec. 26, NW¼NW¼, unsurveyed;
sec. 27 N½, SW¼, N½SE¼, and SW¼SE¼, unsurveyed;
sec. 28, unsurveyed.

The areas described aggregate approximately 4,810 acres (19.47 km^2).

Millers SEZ:

T. 3 N., R. 39 E.,
sec. 1;

sec. 2, lot 1, S½NE¼, NE¼SW¼, S½SW¼, and SE¼;
sec. 11, N½N½ and SW¼NW¼;
sec. 12, N½NW¼.

T. 4 N., R. 39 E.,
sec. 36, E½NE¼, SW¼NE¼, NE¼SW¼, S½SW¼, and SE¼.

T. 3 N., R. 40 E.,
sec. 4, lots 3 and 4, S½NW¼, and NW¼SW¼;
sec. 5, lots 1 to 4, inclusive, S½N½, and N½S½;
sec. 6.

T. 4 N., R. 40 E.,
sec. 10, S½S½;
sec. 11, S½;
sec. 12, SW¼NE¼, S½NW¼, SW¼, and W½SE¼;
sec. 13, W½E½ and W½;
secs. 14, 15, and 16;
sec. 17, S½N½ and S½;
sec. 18, SE¼;
sec. 19, E½, E½NW¼, and NE¼SW¼;
secs. 20 to 23, inclusive;
sec. 24, W½E½ and W½;
sec. 25, NW¼ and W½SW¼;
secs. 26 to 29, inclusive;
sec. 30, lot 4, E½, and E½SW¼;
secs. 31 and 32;
sec. 33, N½, N½S½, and S½SW¼;
sec. 34;
sec. 35, N½, SW¼, and W½SE¼.

The areas described aggregate approximately 16,787 acres (67.93 km^2).

NEW MEXICO

Below is the legal description for the proposed Afton SEZ land withdrawal area in New Mexico.

The Afton SEZ lies within Township 24 south, Range 2 west, sections 23 to 26, and 35; Township 24 south, Range 1 west, sections 19, and 28 to 35; Township 25 south, Range 2 west, section 1; Township 25 south, Range 1 west, sections 1, 3 to 6, 8 to 15; and Township 25 south, Range 1 east, Sections 7, 8, 14, 15, 17 to 23, 25 to 30, and 33 to 35 (New Mexico Principal Meridian).

UTAH

Below are the legal descriptions for the three proposed SEZ land withdrawal areas in Utah.

Salt Lake Meridian

Escalante Valley SEZ:

T. 33 S., R. 14 W.,
sec. 8, NE¼, E½NW¼, SW¼NW¼, and S½;
sec. 9, E½NE¼, S½SW¼, and SE¼;
sec. 10;
sec. 11, W½ and W½SE¼, those portions lying west of Railroad Right-of-Way Grant UTSL 0032533;
sec. 14, E½, that portion lying west of Railroad Right-of-Way Grant UTSL 0032533;
secs. 15, 17, 19, 30, and 31.

T. 33 S., R. 15 W.,
secs. 24 and 25.

T. 34 S., R. 14 W.,
sec. 6, lot 4.

The areas described above aggregate approximately 6,614 acres (27 km^2).

Milford Flats South SEZ:

T. 30 S., R. 10 W.,
sec. 18, lots 1 and 2, and E½NW¼.

T. 30 S., R. 11 W.,
sec. 7, lots 3 and 4, and E½SE¼;
sec. 8, SW¼ and W½SE¼;
sec. 10, NE¼, E½NW¼, and S½;
sec. 12, W½;
sec. 13, N½, N½SW¼, and NW¼SE¼;
sec. 14, N½, SW¼, N½SE¼, SW¼SE¼;
secs. 15, 17, and 18;
sec. 19, lots 1 and 2, NE¼, and E½ NW¼;
sec. 20;
sec. 21, N½, N½S½, and SW¼SW¼;

sec. 22, N½NE¼ and NW¼;
sec. 29, N½NW¼;
sec. 30, N½NE¼.

The areas described above aggregate approximately 6,480 acres (26 km^2).

Wah Wah Valley SEZ:

T. 27 S., R. 14 W.,
sec. 8, E½ and SE¼SW¼;
sec. 9, N½, N½SW¼, SE¼SW¼, and SE¼;
sec. 10;
sec. 11, lots 1 and 2, SW¼NE¼, S½NW¼, SW¼, and W½SE¼;
sec. 13, lot 1;
secs. 14 and 15;
sec. 17, NW¼NE¼;
sec. 21, lots 1 and 6, and E½NE¼;
secs. 22 and 23;
sec. 26, N½ and N½S½;
sec. 27, N½ and N½S½;
sec. 28, NE¼ and N½SE¼.

The areas described above aggregate approximately 6,097 acres (25 km^2).