

1 **2 DESCRIPTION OF ALTERNATIVES AND REASONABLY FORESEEABLE**
2 **DEVELOPMENT SCENARIO**

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5 **2.1 INTRODUCTION**
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7 This programmatic environmental impact statement (PEIS) examines alternative
8 management approaches for utility-scale solar energy development that could be implemented
9 by the U.S. Department of the Interior (DOI) Bureau of Land Management (BLM) and the
10 U.S. Department of Energy (DOE).
11

12 For the BLM, the PEIS examines the no action alternative, which would continue the
13 BLM's existing policies, and two action alternatives, each of which would have the BLM
14 establish a comprehensive program to facilitate utility-scale solar energy development on BLM
15 lands.¹ The BLM may choose to adopt one of the alternatives or a combination of alternatives;
16 selected alternatives may also vary by geographic region. The BLM's final decisions regarding
17 its Solar Energy Program will be informed by public comment and ongoing consultations. The
18 three BLM alternatives that are examined include:
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- 20 • A no action alternative that continues the issuance of right-of-way (ROW)
21 authorizations for utility-scale solar energy development on BLM-
22 administered lands by implementing the requirements of the BLM's existing
23 solar energy policies on a project-by-project basis. Lands available for solar
24 energy development would include those areas currently allowable under
25 existing applicable laws and statutes (approximately 99 million acres
26 [400,000 km²] in the six-state study area) and in conformance with the
27 approved land use plan(s).
28
- 29 • A solar energy development program alternative that applies new program
30 administration and authorization policies and design features² for utility-scale
31 solar energy development on BLM-administered lands to a subset of BLM-
32 administered lands that would be available for solar energy ROW applications
33 (approximately 22 million acres [87,336 km²] in the six-state study area).
34 Within the available lands, the BLM would identify approximately
35 677,400 acres (2,741 km²) in solar energy zones, which are lands identified by
36 the BLM as best-suited for utility-scale production of solar energy and where
37 the BLM would prioritize development (as well as development of associated
38 transmission infrastructure).
39

1 ¹ Utility-scale facilities are defined as projects that generate electricity that is delivered into the electricity transmission grid, generally with capacities greater than 20 megawatts (MW). As a result, the BLM's new Solar Energy Program would apply only to projects of this scale; decisions regarding projects that are less than 20 MW would continue to be made in accordance with existing land use plan requirements.

2 ² See text box on page 2-4 for more information about design features versus mitigation measures.

- A solar energy zone (SEZ) program alternative that applies the same new program administration and authorization policies and design features to utility-scale solar energy development but restricts applications to SEZs only (up to approximately 677,400 acres [2,741 km²] in the six-state study area).

DOE examines two alternatives in this PEIS:

- A no action alternative under which DOE continues its existing case-by-case process for addressing environmental concerns for solar projects supported by the agency on any lands (i.e., not restricted to BLM-administered lands); and
- A programmatic environmental guidance alternative that develops guidance with recommended environmental best management practices and mitigation measures that could be applied to all DOE solar energy projects.

This chapter describes each of the agencies' alternatives in detail, including the specific policies, guidelines, and mitigation measures that would be implemented under the various alternatives. The BLM program would be applicable to all utility-scale solar energy technologies implemented under BLM jurisdiction in the six-state study area (i.e., projects implemented under a BLM-issued ROW authorization). The DOE guidance would be applicable to all utility-scale solar energy technologies implemented under DOE's jurisdiction (i.e., DOE-funded solar projects), as appropriate. Technologies described in Chapter 3 are representative of technologies most likely to be deployed over the next 20 years; however, the agencies' programs could apply to other technologies, with additional mitigation requirements developed on a project-by-project basis, as applicable.

This chapter also presents the results of a reasonably foreseeable development scenario (RFDS) analysis for solar energy over the next 20 years (Section 2.4) and discusses other alternatives and issues considered but eliminated from detailed analysis in this PEIS (Section 2.5).

2.2 BLM'S ALTERNATIVES

The three BLM alternatives introduced above are described in the following subsections. The total estimated acreages of BLM-administered lands potentially available for utility-scale solar energy ROW applications under each of the three alternatives are summarized by state in Table 2.2-1. Maps showing the approximate locations of these lands (and of specifically excluded BLM-administered lands) are provided in Figures 2.2-1 through 2.2-6 at the end of this chapter.

2.2.1 No Action Alternative

Under the no action alternative, solar energy projects would be developed through ROW authorizations in accordance with the BLM's existing Solar Energy Policies (BLM 2007,

TABLE 2.2-1 Summary of Potentially Developable BLM-Administered Land under the No Action Alternative, the Solar Energy Development Program Alternative, and the SEZ Program Alternative^a

State	Total State Acreage ^b	BLM-Administered Lands Constituting No Action Alternative (acres)	BLM-Administered Lands Constituting Solar Energy Development Program Alternative (acres) ^c	BLM-Administered Lands Constituting SEZ Program Alternative (acres)
Arizona	72,700,000	9,218,009	4,485,944	13,735
California	100,200,000	11,067,366	1,766,543	339,090
Colorado	66,500,000	7,282,061	148,072	21,050
Nevada	70,300,000	40,794,055	9,084,050	171,265
New Mexico	77,800,000	12,188,361	4,068,324	113,052
Utah	52,700,000	18,182,368	2,028,222	19,192
Total	440,200,000	98,732,220	21,581,154	677,384

^a To convert acres to km², multiply by 0.004047.

^b From Table 4.2-1.

^c The acreage estimates were calculated on the basis of the best available geographic information system (GIS) data. GIS data were not available for the entire set of exclusions listed in Table 2.2-2; thus the exact acreage could not be calculated. Exclusions that could not be mapped would be identified during the ROW application process.

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3 2010a,b) (see Appendix A, Section A.1). These policies establish general guidelines for
4 processing solar energy development applications, a maximum term for authorizations, and
5 requirements for diligent development and bond coverage; they also provide interim guidance to
6 BLM field offices on how to calculate rent for utility-scale solar energy facilities. National
7 Environmental Policy Act (NEPA) analyses for solar energy development on BLM-administered
8 lands would be prepared on a project-by-project basis. ROW exclusion areas and mitigation
9 measures for solar energy development would be implemented in accordance with approved land
10 use plans. In addition, projects that require land use plan amendments would be dealt with on an
11 individual basis as needed. BLM-administered lands currently off-limits to solar energy
12 development include lands prohibited by law, regulation, Presidential proclamation or Executive
13 Order (e.g., lands in the National Landscape Conservation System^{3,4}).
14

³ The boundaries of National Landscape Conservation System (NLCS) units may be expanded by legislation, or Congress may establish entirely new NLCS units. See, for example, Public Law (P.L.) 111-11. Such lands would be removed automatically from the area of BLM-administered public lands available for solar energy development.

⁴ Wilderness areas within the NLCS do not include the Tabeguache Area in Colorado because it is not officially designated as wilderness; however, by act of Congress, this area is to be managed as wilderness and, as a result, solar energy development is prohibited in the Tabeguache Area.

1 **2.2.2 BLM Action Alternatives**

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4 **2.2.2.1 Program Components Common to Both BLM Action Alternatives**

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6 The BLM proposes to establish a common set of program administration and
7 authorization policies and required design features applicable to all future utility-scale solar
8 energy development on BLM-administered lands. These program components would be common
9 to both of the action alternatives. The policies and design features would bring consistency and
10 efficiency to the BLM’s solar energy development authorization process and as part of project
11 formulation would help to avoid and/or minimize many of the potential resource impacts
12 associated with solar energy development.

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14
15 **Solar Energy Program Administration and Authorization Policies**

16
17 As part of its action alternatives, the BLM proposes to adopt a set of standard program
18 administration and authorization policies for utility-scale solar energy development on BLM-
19 administered lands, replacing certain elements of its current Solar Energy Policies (BLM 2007,
20 2010a,b; see Appendix A, Section A.1).⁵ The proposed policies establish requirements for
21 coordination and/or consultation with other federal and state agencies and for government-to-
22 government consultation, and establish requirements for public involvement. Collectively, these
23
24

Design Features and Mitigation Requirements

Design features are mitigation measures that have been incorporated into the proposed action or alternatives to avoid or reduce adverse impacts. The proposed programmatic design features of the Solar Energy Program would apply to all utility-scale solar energy ROWs on BLM-administered lands under both action alternatives. Additional design features have been proposed for individual SEZs.

Mitigation measures are measures that could reduce or avoid adverse impacts. Mitigation measures can include (40 CFR 1508.20):

- Avoiding the impact altogether by not taking a certain action or parts of an action;
- Minimizing the impact by limiting the degree of magnitude of the action and its implementation;
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
- Compensating for the impact by replacing or providing substitute resources or environments.

⁵ It is anticipated that elements of the existing policies addressing rental fees, term of authorizations, due diligence, bonding requirements, and BLM access to records would remain in effect.

1 policies ensure that all projects are thoroughly reviewed, input is collected from all interested
2 stakeholders, and projects that could result in significant adverse impacts are eliminated early in
3 the planning process. The proposed policies are presented in Appendix A, Section A.2.1. These
4 policies would apply to all future and existing ROW applications.
5

6 Applications for solar energy ROWs are continuing to be received during the
7 development of the PEIS for all lands not currently excluded as described in Section 2.2.1
8 or not currently excluded in approved land use plans. These applications are being processed
9 in accordance with the BLM's current Solar Energy Policies (BLM 2007, 2010a,b)
10 (see Appendix A, Section A.1, of this PEIS). The BLM has notified applicants previously
11 through the *Federal Register* Notice (June 30, 2009) that any ROW authorization for a solar
12 energy application filed before issuance of the BLM's Record of Decision (ROD) for the Solar
13 PEIS could be subject to the requirements adopted in the ROD, including any alternative
14 procedures developed by the BLM for noncompetitive and competitive processes. Applications
15 for solar energy ROWs received after June 30, 2009, for lands inside the Solar Energy Study
16 Areas (to be termed solar energy zones at issuance of the ROD) would be subject to the ROD for
17 the Solar PEIS and any alternative procedures developed by the BLM for non-competitive and
18 competitive processes. Any applications for solar energy ROWs received after issuance of the
19 ROD would be subject to the conditions contained in the ROD.
20

21 The BLM's proposed action alternatives identified in this PEIS would not eliminate the
22 need for site-specific environmental review for individual utility-scale solar energy development
23 applications. Site-specific environmental reviews would be tiered to the PEIS. Tiering would
24 involve incorporating relevant data and analyses from the PEIS and narrowing detailed analyses
25 to site-specific and project-specific considerations. Additional mitigation measures could be
26 applied to individual projects as part of future site-specific environmental reviews in the form of
27 stipulations in the ROW authorization, as appropriate, to address site-specific issues such as
28 specific species and/or habitat concerns. The BLM retains the authority to deny applications for
29 solar ROWs based on site-specific issues or concerns, even in areas available or open to
30 application.
31

32 As a key element of the proposed Solar Energy Program, the BLM would establish a new
33 policy requiring the implementation of an adaptive management plan for solar energy
34 development (see Appendix A, Section A.2.1). Although this document identifies the affected
35 environment and anticipated impacts from solar energy development, the BLM recognizes that
36 data regarding actual impacts of solar energy development on various resources are still limited.
37 The proposed policy would require adaptive management to ensure that new data and lessons
38 learned about the impacts of solar energy projects would be reviewed and, as appropriate,
39 incorporated into the Solar Energy Program. The proposed adaptive management plan, to be
40 coordinated with potentially affected natural resource management agencies, would identify how
41 the impacts of the Solar Energy Program will be evaluated; types of monitoring that would be
42 responsive to the data needs for program evaluation; science-based thresholds for modification
43 of policy or individual project management based upon monitoring results; and a description of
44 the process by which changes will be incorporated into the Solar Energy Program, including
45 revisions to policies and design features. Sources of information to be considered in the context

1 of adaptive management include data from specific project evaluations (for which monitoring
2 will be required) as well as from project-specific and regional long-term monitoring programs.
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5 **Required Solar Energy Design Features**

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7 As part of its action alternatives, the BLM proposes to adopt a set of required design
8 features to ensure the most environmentally responsible development and delivery of utility-
9 scale solar energy on BLM-administered lands. The proposed design features are presented in
10 Appendix A, Section A.2.2, by resource area and also by project phase (e.g., siting and design,
11 site characterization, construction, operations, and decommissioning) where appropriate.
12

13 Design features are means, measures, or practices intended to reduce or avoid
14 adverse environmental impacts. The design features have been formulated on the basis of a
15 comprehensive analysis of the potential impacts of utility-scale solar energy development and
16 potentially applicable mitigation measures (Chapter 5). Existing, relevant mitigation guidance
17 (Section 3.7.3) and comments received during scoping for the Draft PEIS (summarized in
18 Section 14.1) also were reviewed. On the basis of those reviews, the BLM identified required
19 programmatic design features that would be applicable to all utility-scale solar energy projects
20 on BLM-administered lands.
21

22 The required design features would establish the minimum specifications for
23 management of individual solar energy projects and mitigation of adverse impacts. These design
24 features are items that would need to be incorporated into project-specific Plans of Development
25 (PODs) and ROW authorization stipulations. Since these features represent the most widely
26 accepted methods to avoid and/or minimize impacts, they do not lend themselves to alternatives
27 analysis. In general, the design features are accepted practices that are known to be effective
28 when implemented properly at the project level. However, their applicability and overall
29 effectiveness cannot be fully assessed except at the project-specific level when the project
30 location and design are known.
31

32 Many of the potential design features indicate the need for project-specific plans. The
33 content and applicability of these plans will depend on specific project requirements and
34 locations. These plans, which are listed in Table 5.1-1, are identified in the design features
35 presented in Appendix A. The authorizing officer would need to determine the adequacy of such
36 plans before approving a specific project.
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39 **2.2.2.2 Solar Energy Development Program Alternative**

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41 **Lands Available**

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44 As discussed throughout the PEIS, all BLM-administered lands are not appropriate for
45 solar energy development. Environmental and technical screening tools can be used to guide
46 solar energy developers to areas where there are fewer resource conflicts and potential

1 controversy. This process has been described as “screening for success.” Under the solar energy
2 development program alternative, the BLM would make a more limited amount of BLM-
3 administered lands available for utility-scale solar energy ROW applications than under the no
4 action alternative by excluding or “screening out” categories of land that are known or believed
5 to be unsuitable for utility-scale solar development. This would allow time and effort to be
6 directed to those projects which have a greater chance of success. The exclusions would apply
7 only to the siting of utility-scale solar energy generation facilities and not to any required
8 supporting linear infrastructure, such as roads, transmission lines, and natural gas or water
9 pipelines. Management decisions for supporting linear infrastructure, including available lands,
10 are defined in existing applicable land use plans. Siting of supporting infrastructure would be
11 analyzed in project-specific environmental reviews.

12
13 Because of the characteristics of the solar energy technologies evaluated in this PEIS,
14 there are limitations with respect to the slope of the land upon which they can be constructed.
15 These limitations are discussed in detail in Section 3.1. On the basis of these limitations, the
16 BLM would limit the lands available for utility-scale solar development to those with slopes
17 of less than 5%. Additionally, the BLM chose a minimum solar insolation level threshold of
18 6.5 kWh/m²/day to identify lands that would potentially be available for solar energy
19 development. That criterion was established on the basis of the assumption that at insolation
20 levels below 6.5 kWh/m²/day, utility-scale development would be less economically viable
21 given current technologies. These proposed restrictions will help maximize the efficient use
22 of BLM-administered lands and meet the multiple use intent of the Federal Land Policy and
23 Management Act of 1976 (FLPMA) by reserving for other uses lands that are not well-suited
24 for solar energy development.⁶

25
26 Utility-scale solar energy development involves large parcels of land (e.g., a range of
27 facility sizes from 90 to 6,750 acres [0.4 to 27 km²] is assumed in this PEIS; see Section 3.1.5)
28 that are converted to single-use (year-round, permanent development). The BLM has determined
29 that because of the nature of these activities, utility-scale solar energy development is not
30 compatible with many of the resources, resource uses, and special designations that exist on
31 BLM-administered lands. The proposed exclusions under the solar energy development program
32 alternative are listed in Table 2.2-2. Note that many of these exclusions refer back to decisions
33 made in the approved land use plans (e.g., ROW avoidance areas). It is anticipated that the BLM
34 will continue to amend or revise land use plans over time to adapt to changing circumstances or
35 new information, and that the shape, size, and/or location of exclusions or priority development
36 areas may change accordingly. The Solar Energy Program is intended to adapt and conform to
37 future land use plan decisions. As an example, the Restoration and Energy Design Project
38 currently underway in Arizona (see Section 1.6.2.4), could result in the refinement of the

⁶ Because utility-scale solar development requires substantial amounts of land, the BLM originally planned to exclude contiguous areas of less than 247 acres (1 km²) from lands available for development, and such lands are not currently shown in the maps or included in the acreages presented under the program alternatives. However, comments received through ongoing, internal scoping indicate that such parcels could be used to support community-scale solar energy development or support projects on adjacent private or Tribal lands. For these reasons, small parcels that otherwise meet the criteria of the program alternatives are included in the program alternatives. Maps and acreages will be updated in the Final PEIS.

**TABLE 2.2-2 Areas for Exclusion under the BLM Solar Energy Development Program
Alternative^a**

1. Lands with slopes greater than or equal to 5%.
 2. Lands with solar insolation levels less than 6.5 kWh/m²/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. All Special Recreation Management Areas (SRMAs), developed recreational facilities, and special-use permit recreation sites (e.g., ski resorts and camps).
 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; and flat-tailed horned lizard habitat.
 9. All ROW exclusion areas designated in applicable plans.
 10. All ROW avoidance areas designated in applicable plans.
 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 Class I or II (and, in Utah, Class III^b).
 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.
 19. National Historic and Natural Landmarks.
-

TABLE 2.2-2 (Cont.)

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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.
 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 this PEIS.^c
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- ^a Consultation with the U.S. Fish and Wildlife Service is ongoing and could result in the modification, refinement, or addition of exclusion areas.
- ^b In Utah, Visual Resource Management (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).
- ^c For example, lands considered but not included in the approved applications for BrightSource Energy's Ivanpah Solar Electric Generating System, Tessera Solar's Imperial Valley and Calico Solar Projects, NextEra's Genesis Ford Dry Lake Solar Project, and Solar Millennium's Blythe Solar Project.

1
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3 exclusion areas in Arizona under the Solar Energy Program, in the identification of additional
4 areas where solar energy development will be a priority, or both.
5

6 It was not possible to obtain complete geographic information system (GIS) data across
7 the six-state study area for the entire set of exclusions listed in Table 2.2-2; thus the exact
8 footprint of the alternative could not be mapped (and the exact total acreage could not be
9 calculated).⁷ However, data for several key exclusion area categories were obtained and are
10 used in this PEIS as an interim estimate of the Solar Energy Program footprint. Exclusion areas
11 that were mapped for the solar energy development program alternative (in addition to those
12 excluded under the no action alternative) include lands with slope greater than or equal to 5%;
13 lands with average solar insolation of less than 6.5 kWh/m²/day; critical habitat for threatened or
14 endangered species as designated by the U.S. Fish and Wildlife Service; and the following areas
15 designated under various BLM programs: Areas of Critical Environmental Concern (ACECs);
16 Desert Wildlife Management Areas (DWMAs); flat-tailed horned lizard habitat, Mohave ground

⁷ As a result of ongoing fast-track project evaluations, some additional BLM-administered lands will be found to be inappropriate for solar development. After identification, such areas will be excluded from lands open for solar ROW application.

1 squirrel habitat; ROW exclusion and avoidance areas, No Surface Occupancy (NSO) areas, and
2 Special Recreation Management Areas (SRMAs).⁸ Exclusion areas that could not be mapped due
3 to lack of data would be identified during pre-application consultations with local BLM staff or
4 site-specific evaluation of individual ROW applications.
5
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7 **Priority Areas in Lands Available (SEZs)**

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9 Under the solar energy development program alternative, the BLM would identify a
10 number of SEZs within the lands available for solar energy development ROWs. An SEZ is
11 defined by the BLM as an area with few impediments to utility-scale production of solar energy
12 where BLM would prioritize solar energy and associated transmission infrastructure
13 development. The BLM worked closely with BLM state and field office staff to identify
14 potential SEZs for further analysis and provided initial criteria to guide the effort. Staff was
15 asked to identify areas that were near existing transmission or designated corridors, near existing
16 roads, generally had a slope of 1 to 2% or less, and were a minimum of 2,500 acres (10.1 km²).
17 Staff was also requested to screen out National Landscape Conservation System (NLCS) lands
18 and the classes of lands listed in Table 2.2-2. Preliminary results of the Western Governors'
19 Association Western Renewable Energy Zone initiative (see Appendix D.1) were used to focus
20 proposed SEZs in Colorado, New Mexico, and Utah to particular BLM administrative units.
21

22 BLM state and field office staff then applied additional filters based on local conditions,
23 institutional knowledge, and coordination efforts. For example, in Arizona, BLM staff used
24 information developed in conjunction with the Arizona Renewable Resource and Transmission
25 Identification Subcommittee (ARRTIS) initiative (see Appendix D.2.2) as the foundation for
26 additional analysis and then selected potential SEZs from areas depicted as having “low
27 sensitivity” based on data provided by the Arizona Department of Game and Fish. In California,
28 proposed SEZs were identified in part based on preliminary outcomes of the Renewable Energy
29 Transmission Initiative (RETI) (see Appendix D.2.3), a collaborative stakeholder process. In
30 Utah, BLM staff used GIS data maintained by the Division of Wildlife Services to screen out
31 sensitive habitat, considered information from Class I cultural surveys, and considered rangeland
32 values in order to identify areas with low potential for resource conflicts. In New Mexico, BLM
33 staff considered U.S. Department of Agriculture (USDA) Agricultural Research Service
34 ecological site descriptions to identify proposed SEZs where loss of topsoil and lack of seed
35 source would make habitat restoration efforts difficult and cost-prohibitive.
36

37 The identification of areas of Tribal concern is underway as part of the ongoing Tribal
38 consultation process. Any changes to the proposed SEZs that are agreed upon during these
39 consultations will be incorporated into the Final PEIS.
40

⁸ Information on ACEC and critical habitat exclusion areas were available for all six states in the study area. Other exclusion areas were not mapped for each state, but only where applicable and if GIS data were available. DWMA, lizard, and ground squirrel habitat were mapped only in the California Desert District; ROW-exclusion and avoidance areas were mapped only in Arizona, New Mexico, and Utah; NSO areas were mapped only in California, Colorado, Nevada and Utah.

1 A public scoping period to receive comments on the proposed SEZs was conducted from
2 June 30 to September 14, 2009 (see Section 14.1). Comments from scoping, as well as additional
3 input from BLM state and field office staff, were used to make some modifications to the
4 proposed SEZs. For example, the proposed Dry Lake Valley North, Afton, and Wah Wah Valley
5 SEZs were expanded based on field office identification of favorable adjacent areas. Two of the
6 New Mexico SEZs were altered to exclude Aplomado falcon habitat and one was altered to
7 exclude additional sensitive resources, including playas of importance to migratory shorebirds.
8 The revised total land area of the proposed SEZs is approximately 677,400 acres (2,741 km²),
9 which is an increase of about 2,300 acres (9.4 km²) over the total acreage as published on
10 June 30, 2009 (which was approximately 675,100 acres [2,732 km²]).
11

12 The proposed SEZs evaluated in the PEIS are listed in Table 2.2-3. As part of the PEIS,
13 the BLM conducted an in-depth analysis for each of the SEZs. The analyses included a site visit
14 to each SEZ, and an extensive effort to collect and evaluate existing data on important resources
15 (e.g., soils, hydrology, land cover, species distribution, air quality, existing ROWs, mining
16 claims, and demographics). Modeling of air quality impacts during construction was conducted,
17 and GIS-based analyses of ecological impacts were included. Local BLM, county, and state
18 offices were contacted, as needed. The SEZ analyses are presented in Chapters 8 through 13.
19

20 Through the SEZ analyses, the BLM discovered potentially significant adverse impacts
21 on various resources and resource uses in some of the SEZs. Where adverse impacts have been
22 identified, additional SEZ-specific design features have been developed, including identification
23 of lands or land types within SEZs where solar development must be avoided (Table 6.1-2). The
24 complete list of SEZ-specific design features is provided in Appendix A, Section A.2.3. Based
25 on the potential conflicts identified, some of the proposed SEZ areas may be reduced in size or
26 eliminated entirely when the final SEZs are identified in the ROD for this PEIS. In the future,
27 based on lessons learned from individual projects and/or new information (e.g., ecoregional
28 assessments), the BLM could decide to expand SEZs, add SEZs, or remove or reduce SEZs.
29 Changes to SEZs would have to go through a land use planning process, which would be subject
30 to the appropriate environmental analysis.
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33 **Management of SEZs**

34
35 The BLM would take the following management actions in areas selected as SEZs:

- 36 • Place a priority on utility-scale solar energy development over other land uses;
- 37 • Consider offering lands for solar energy development through competitive
38 processes or other means;
- 39 • Focus BLM resources to process solar ROW applications;
- 40 • Provide in-depth environmental analyses to support a streamlined
41 environmental process for future solar development activities, with an
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TABLE 2.2-3 Proposed SEZs and Approximate Acreage by State^a

Proposed SEZ (BLM Office/County)	Approximate Acreage
Arizona	
Brenda (Lake Havasu/La Paz)	3,878
Bullard Wash (Hassayampa/Yavapai)	7,239
Gillespie (Lower Sonoran/Maricopa)	2,618
Total	13,735
California	
Imperial East (El Centro/Imperial)	5,722
Iron Mountain (Needles/San Bernadino)	106,522
Pisgah (Barstow/San Bernadino)	23,950
Riverside East (Palm Springs–South Coast/Riverside)	202,896
Total	339,090
Colorado	
Antonito Southeast (La Jara/Conejos)	9,729
De Tilla Gulch (Saguache/Saguache)	1,522
Fourmile East (La Jara/Alamosa)	3,882
Los Mogotes East (La Jara/Conejos)	5,918
Total	21,050
Nevada	
Amargosa Valley (Southern Nevada/Nye)	31,625
Delamar Valley (Ely/Lincoln)	16,552
Dry Lake (Southern Nevada/Clark)	15,649
Dry Lake Valley North (Ely/Lincoln)	76,874
East Mormon Mountain (Ely/Lincoln)	8,968
Gold Point (Battle Mountain/Esmeralda)	4,810
Millers (Battle Mountain/Esmeralda)	16,787
Total	171,265
New Mexico	
Afton (Las Cruces/Dona Ana)	77,623
Mason Draw (Las Cruces/Dona Ana)	12,909
Red Sands (Las Cruces/Otero)	22,520
Total	113,052
Utah	
Escalante Valley (Cedar City/Iron)	6,614
Milford Flats South (Cedar City/Beaver)	6,480
Wah Wah Valley (Cedar City/Beaver)	6,097
Total	19,192
Total	677,384

^a To convert acres to km², multiply by 0.004047.

1 anticipated lower-level effort at the specific site if there are no new
2 circumstances or information relevant to environmental concerns at that site;

- 3
- 4 • Apply specific mitigation requirements as necessary;
- 5
- 6 • Investigate and promote opportunities to consolidate facilities within SEZs in
7 order to reduce development costs and minimize environmental impacts; and
- 8
- 9 • Prioritize associated electricity transmission projects and needs.

10

11 The Secretary of the Interior may decide to withdraw the public lands included in the
12 SEZs from potentially conflicting uses through the issuance of a Public Land Order. As a
13 possible mechanism to support the establishment of priority areas that are best suited for utility-
14 scale production of solar energy, the Secretary of the Interior issued a notice of proposed
15 withdrawal for the preliminary SEZ areas (June 30, 2009). This notice segregates the public
16 lands encompassed in the SEZ areas for up to 2 years from surface entry and mining while
17 various studies and analyses are made to support a final decision on the withdrawal application
18 (see Section 1.3.5, BLM Land Withdrawals). A Secretarial decision regarding withdrawal is a
19 separate action from the land use plan amendments that would be addressed in the ROD for this
20 PEIS. The decision to withdraw lands would rely on the analysis in this PEIS but would be the
21 subject of a separate decision document.

22

23 The acreage totals of BLM-administered lands available for utility-scale solar energy
24 ROW applications under the solar energy development program alternative are summarized by
25 state in Table 2.2-1. The areas of the subset of those lands that are within the proposed SEZs are
26 also summarized in Table 2.2-1. Maps showing the approximate locations of the lands available,
27 including the SEZs, are provided in Figures 2.2-1 through 2.2-6 at the end of this chapter.
28 Exclusion areas that could not be mapped due to lack of data would be identified during pre-
29 application consultations with local BLM staff or site-specific evaluation of individual ROW
30 applications.

31

32

33 **BLM Land Use Plans To Be Amended**

34

35 Under the solar energy development program alternative, most of the land use plans in
36 the six-state study area would be amended to address utility-scale solar energy development.⁹

⁹ Under this alternative, most of the land use plans in the six-state study area would be amended. Section 2815(d) of the National Defense Authorization Act (NDAA) for Fiscal Year 2000 (P.L. 106-65) placed a moratorium on planning efforts on BLM-administered lands “adjacent to, or near the Utah Test and Training Range (UTTR) and Dugway Proving Grounds or beneath Military Operating Areas, Restricted Areas, and airspace that make up the UTTR” NDAA § 2815(a), 113 Stat. 512, 852 (1999). This area encompasses a portion of the lands within the boundaries of the Box Elder, Pony Express, House Range, Warm Springs, and Pinyon land use plans. Within these areas, decisions related to whether lands would be available for ROW application, and adoption of the policies and design features of the PEIS, cannot be implemented via land use plan amendments at this time. Solar energy development ROW applications would be deferred until such time plan amendments or new land use plan(s) address solar energy development. No SEZs are located within the UTTR affected areas.

1 The amendments would identify lands that would be excluded from utility-scale solar energy
2 development, lands that would be available for ROW application, and lands that would be
3 included in SEZs. For those areas that would be available for application, the plans would
4 be amended to adopt the proposed program administration and authorization policies and
5 programmatic and SEZ-specific design features. Land use plans that are undergoing revision
6 or amendment concurrent with the Solar PEIS will be reviewed to identify and resolve
7 inconsistencies between the PEIS and individual planning efforts. The BLM field offices that
8 administer lands to be made available for solar ROW applications under the solar energy
9 development program alternative are listed in Table 2.2-4, along with the approximate amount of
10 land that would be made available. The specific amendments for this alternative are presented in
11 Appendix C.

14 **2.2.2.3 SEZ Program Alternative**

15
16 In response to comments received during the scoping process and concerns expressed
17 regarding resource impacts, the BLM has elected to consider an alternative that limits utility-
18 scale solar energy development to priority areas (i.e., to SEZs). Under the SEZ program
19 alternative, the BLM would adopt the same set of standard program administration and
20 authorization policies for utility-scale solar energy development as proposed under the solar
21 energy development program alternative, but it would authorize such solar energy development
22 only in SEZs. Unlike the solar energy development program alternative, lands outside of SEZs
23 would be excluded from utility-scale solar energy ROWs. Under the SEZ program alternative,
24 the management of SEZs would be the same as described for the solar energy development
25 program alternative, including the potential for the BLM to expand, add, remove, or reduce SEZs
26 in the future on the basis of new information and lessons learned (see Section 2.2.2.2). In
27 addition to the proposed program administration and authorization policies and programmatic
28 design features (i.e., those that would apply to all solar projects on BLM-administered lands),
29 SEZ-specific design features have been identified in the PEIS and may be adopted as part of the
30 ROD. Detailed analyses of impacts of solar energy development within the proposed SEZs are
31 provided in Chapters 8 through 13; these assessments are incorporated into the assessment of
32 BLM alternatives provided in Chapter 6.

35 **Lands Available**

36
37 Under the SEZ program alternative, the BLM would accept utility-scale solar ROW
38 applications only for lands within identified SEZs. The proposed SEZs are the same as those
39 proposed under the solar energy development program alternative (areas given in Table 2.2-1;
40 locations shown in Figures 2.2-1 through 2.2-6 at the end of this chapter). As stated in
41 Section 2.2.2.2, the locations of the proposed SEZs were preliminarily identified by BLM state
42 and field office staff as locations thought to have few impediments to solar energy development.

TABLE 2.2-4 BLM Field Offices with Lands Available for Solar Facility ROW Application under the Solar Energy Development Program and SEZ Program Alternatives^a

Field/District Office	Approximate Acres Available	
	Solar Energy Development Program Alternative ^b	SEZ Program Alternative
<i>Arizona</i>		
Arizona Strip	906,507	0
Hassayampa	338,445	7,239
	(7,239 in SEZs)	
Kingman	625,777	0
Lake Havasu	536,993	3,878
	(3,878 in SEZs)	
Lower Sonoran	555,328	2,618
	(2,618 in SEZs)	
Safford	709,824	0
Tucson	136,024	0
Yuma	677,046	0
Total	4,485,944	13,735
<i>California</i>		
Bakersfield	337	0
Barstow	359,871	23,950
	(23,950 in SEZs)	
Bishop	95,509	0
El Centro	221,533	5,722
	(5,722 in SEZs)	
Needles	667,447	106,522
	(106,522 in SEZs)	
Palm Springs-South Coast	408,077	202,896
	(202,896 in SEZs)	
Ridgecrest	13,769	0
Total	1,766,543	339,090
<i>Colorado</i>		
Columbine	363	0
Del Norte	9,869	0
Dolores	9,042	0
Gunnison	3,124	0
La Jara	76,831	19,529
	(19,529 in SEZs)	
Royal Gorge	10,755	0
Saguache	38,088	1,522
	(1,522 in SEZs)	
Total	148,072	21,050

TABLE 2.2-4 (Cont.)

Field/District Office	Approximate Acres Available	
	Solar Energy Development Program Alternative ^b	SEZ Program Alternative
<i>Nevada</i>		
Battle Mountain	4,028,449 (21,597 in SEZs)	21,597
Carson City	863,456	0
Ely	3,327,761 (102,394 in SEZs)	102,394
Southern Nevada	789,823 (47,273 in SEZs)	47,273
Winnemucca	74,561	0
Total	9,084,050	171,265
<i>New Mexico</i>		
Carlsbad	257,828	0
Farmington	364,575	0
Las Cruces (District)	1,792,899 (113,052 in SEZs)	113,052
Rio Puerco	287,054	0
Roswell	722,150	0
Socorro	633,472	0
Taos	10,346	0
Total	4,068,324	113,052
<i>Utah</i>		
Cedar City	804,181 (19,192 in SEZs)	19,192
Fillmore	982,283	0
Kanab	23,572	0
Moab	1,210	0
Monticello	85,722	0
Richfield	122,646	0
St. George	8,608	0
Total	2,028,222	19,192
Total by Alternative	21,581,154	677,384

Footnotes on next page.

TABLE 2.2-4 (Cont.)

- a Proposed land use plan amendments for the plans in these field and district offices are presented in Appendix C. To convert acres to km², multiply by 0.00405. Totals may be off due to rounding.
- b The acreage estimates were calculated on the basis of the best available GIS data. GIS data were not available for the entire set of exclusions listed in Table 2.2-2, so the exact acreage could not be calculated. Exclusions that could not be mapped would be identified during the ROW application process.

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BLM Land Use Plans To Be Amended

Under the SEZ program alternative, most of the land use plans in the six-state study area would be amended to address solar energy development.¹⁰ The amendments would identify lands that would be excluded from utility-scale solar energy development and lands that would be included in SEZs. For those SEZs where lands would be available for application, the plans would be amended to adopt the proposed program administration and authorization policies and programmatic and SEZ-specific design features. Land use plans that are undergoing revision or amendment concurrent with the Solar PEIS would need to carry forward the Solar PEIS amendments into future decisions. The proposed SEZs and the BLM field offices and counties in which they are located are listed in Table 2.2-3. The BLM field offices that administer lands to be identified as SEZs under the SEZ program alternative are listed in Table 2.2-4. The specific amendments for this alternative are presented in Appendix C.

2.3 DOE’S ALTERNATIVES

2.3.1 No Action Alternative

Under the no action alternative, DOE would continue its existing case-by-case process for addressing environmental concerns for solar projects supported by DOE on any lands (i.e., not restricted to BLM-administered lands). It would not develop programmatic environmental guidance with recommended environmental best management practices and mitigation measures that could be applied to all DOE-funded solar projects.

¹⁰ See footnote 9.

1 **2.3.2 DOE’s Proposed Action: Programmatic Environmental Guidance Alternative**

2
3
4 **2.3.2.1 Scope of DOE’s Proposed Action**

5
6 Under the proposed action (action alternative), DOE would develop programmatic
7 environmental guidance to further integrate environmental considerations into its analysis and
8 selection of solar projects that it would support. This PEIS assesses the potential impacts of
9 utility-scale solar development on the environment in order to support the development of
10 DOE’s programmatic guidance.

11
12 Under DOE’s programmatic environmental guidance alternative, DOE would use
13 the information about environmental impacts provided in this PEIS to appropriately amend its
14 programmatic approaches to facilitate the advancement of solar energy development. Investment
15 and deployment strategies would incorporate guidance on environmental practices and mitigation
16 recommendations for solar energy development in the decision-making process. Having
17 guidance based on the analyses of this PEIS would give DOE the tools with which to make more
18 informed, environmentally sound decisions regarding projects, and specifically would enable
19 DOE to comprehensively (1) determine where to make technology and resource investments to
20 minimize the environmental impacts of solar technologies; and (2) establish environmental
21 mitigation recommendations for financial assistance recipients to consider in project plans when
22 applying for DOE funding. The environmental practices and mitigation recommendations
23 identified in the PEIS and adopted by DOE would help to streamline future environmental
24 analysis and documentation for DOE-supported solar projects.

25
26 Specifically, the proposed action that DOE is considering under this PEIS is
27 to develop guidance to address environmental impacts to be applied to DOE-funded solar
28 projects, as applicable, in order to support research, development, and deployment of
29 utility-scale solar projects, with DOE’s mitigation recommendations to address
30 programmatic technology performance goals (to be established at the time of future site-
31 specific project NEPA reviews). These technology performance goals will be determined
32 on the basis of the potential impacts of different solar technologies. The performance
33 goals will also consider the results of the cumulative impacts of solar energy market
34 penetration projected assuming a reasonably foreseeable development scenario (see
35 Section 2.4).

36
37
38 **2.3.2.2 DOE’s Proposed Mitigation Recommendations under the Programmatic**
39 **Environmental Guidance Alternative**

40
41 DOE’s proposed mitigation recommendations would be formulated on the basis of
42 a comprehensive analysis of the potential impacts of utility-scale solar energy development
43 and potentially applicable mitigation measures, as presented in Chapter 5. Existing, relevant
44 mitigation guidance (Section 3.7.3) was reviewed, and comments received during scoping for
45 the Draft PEIS (summarized in Section 14.1) were also considered. On the basis of these
46 assessments and the input from this NEPA process, DOE would identify programmatic guidance

1 with recommended environmental practices and mitigation measures for all solar energy projects
2 supported by the DOE. These mitigation recommendations would be used, as appropriate, for
3 decision making and management of individual solar energy projects.
4

5 6 **2.4 DESCRIPTION OF REASONABLY FORESEEABLE DEVELOPMENT SCENARIO** 7

8 A full assessment of the potential impact of solar energy development on the quality of
9 the human and ecological environment over the next 20 years requires that an estimate be made
10 of the amount of development that might occur in the six-state study area over that time frame.
11 The amount of power projected to be generated through solar energy development in the six-state
12 study area through the year 2030 is referred to as the “Reasonably Foreseeable Development
13 Scenario” (RFDS) in this PEIS. Two methods were used to estimate an RFDS for this
14 assessment. One method used the Regional Energy Deployment System (ReEDS) model,
15 developed by the National Renewable Energy Laboratory (NREL). The second method used
16 each state’s Renewable Portfolio Standards (RPSs; see Table 1.6.1) to estimate corresponding
17 renewable energy and solar development required to meet those standards. Results obtained by
18 both methods are presented in Table 2.4-1. Both methods require many assumptions
19 (e.g., assumptions regarding future energy demand, energy costs, and possible future federal and
20 state legislative requirements). Detailed discussions of the two methods, including assumptions
21 used, are provided in Appendix E.
22

23 To establish an upper bound on potential environmental impacts under the various
24 alternatives assessed in this PEIS, the maximum estimated development as projected by the
25 RPS-based method is used as the RFDS for the cumulative impact assessments presented in
26 Chapters 6 and 7.
27

28 29 **2.4.1 Capacity Estimates Based on ReEDS Model** 30

31 The ReEDS model, described in detail in Appendix E, Section E.1, estimates the degree
32 to which solar energy technology will contribute to electricity generation over time, considering
33 such issues as access to and cost of transmission capacity, solar technology developments, cost
34 of other fuels, tax credits, and potential barriers to solar resource development. The model
35 estimates both utility-scale concentrating solar power (CSP) and photovoltaic (PV) development
36 levels. Factors like solar insolation levels and access to transmission facilities are used to
37 estimate the probability of development in a specific geographic area. A summary of solar power
38 development on BLM-administered lands and other lands in the six-state area over the next
39 20 years that is based on the ReEDS model is included in Table 2.4-1. The ReEDS estimates that
40 consider the costs of solar in relation to other available energy sources resulted in lower
41 estimated solar energy development through 2030 (i.e., about 22,000 MW) than the RPS-based
42 estimates (i.e., about 32,000 MW).

TABLE 2.4-1 Projected Megawatts of Solar Power Development by 2030 (by State and Landholding) and Corresponding Developed Acreage Estimates

State	Landholding	Estimated Solar Energy Capacity from ReEDS Model ^a (MW)	Estimated Solar Energy Capacity Range from RPS-Based Method ^b (MW)	Estimated Solar Energy Development Assumed for PEIS (RFDS) (MW) ^c	Estimated Acres Developed under RFDS ^d
Arizona	BLM	1,768	485–2,424	2,424	21,816
	Non-BLM	1,724	162–808	808	7,272
California	BLM	2,207	3,084–15,421	15,421	138,789
	Non-BLM	8,487	1,028–5,140	5,140	46,260
Colorado	BLM	98	439–2,194	2,194	19,746
	Non-BLM	2,197	146–731	731	6,579
Nevada	BLM	1,153	348–1,701	1,701	15,309
	Non-BLM	548	116–567	567	5,103
New Mexico	BLM	353	167–833	833	7,497
	Non-BLM	3,204	56–278	278	2,502
Utah	BLM	0	244–1,219	1,219	10,971
	Non-BLM	0	81–406	406	3,654
	Total for BLM-administered lands	5,479	4,734–23,791	23,791	214,119
	Total for non-BLM lands	16,160	1,592–7,930	7,930	71,370

^a See Appendix E, Section E.1, for details on the ReEDS model methods and assumptions. The estimates given include both utility-scale CPS and PV development; these two technologies are assumed to approximate all utility-scale solar development.

^b See Appendix E, Section E.2, for details on the RPS-based methods and assumptions. For the RPS-based method, it is assumed that 75% of development will occur on BLM-administered lands and that a range of 10 to 50% of the RPS-based requirement for renewable energy production would be provided from solar energy.

^c RFDS = reasonably foreseeable development scenario; see text for description. The RPS-based method values were assumed in order to provide an upper-end estimate of solar development.

^d Acreage calculated assuming land use of 9 acres/MW. To convert acres to km², multiply by 0.004047.

1 **2.4.2 Capacity Estimates Based on RPS Values**
2

3 On the basis of state-specific RPS requirements given in Table 1.6.1, future levels of
4 solar energy generation in each of the six states were estimated. The methodology used,
5 described in detail in Appendix E, Section E.2, relied on a number of assumptions and
6 approximations about factors not well-defined at this time. For example, because most of the
7 RPSs do not specify the amount of renewable energy to be generated by solar energy versus
8 other qualifying renewable resources (e.g., wind, geothermal), the analysis calculated lower and
9 upper ends of the range assuming 10% and 50% of the RPS requirements would be provided by
10 solar facilities. Other factors, such as the potential for utilities to import renewable energy in
11 order to meet RPS requirements, or to develop renewable energy specifically for export to other
12 states, were not considered in the RPS-based calculations because such developments are
13 difficult to predict with accuracy.
14

15 The RPS-based estimates of future solar energy generation at the state level were
16 distributed between development that would occur on BLM-administered lands versus non-
17 BLM-administered lands. An assumption was made that because of agency prioritization of
18 development on BLM-administered lands, 75% of the predicted development would occur on
19 BLM-administered lands. The solar energy development on BLM-administered lands and other
20 lands estimated by use of this RPS-based method is presented in Table 2.4-1.
21

22 There is some uncertainty in the final results of the RPS-based method given the number
23 of assumptions and approximations used; however, many of the assumptions were chosen
24 specifically to result in higher projected levels of solar generation on BLM-administered lands.
25 Consequently, the projections are likely to be high enough to accommodate increases in RPS
26 standards, development of solar energy for markets outside of a given state, or other similar
27 changes.
28

29
30 **2.4.3 RFDS for This PEIS**
31

32 Because the capacity estimates based on RPS values were considerably higher than those
33 based on the ReEDS model (about 32,000 MW vs. 22,000 MW), the RPS-based estimates were
34 assumed as the RFDS for programmatic impact analyses for the PEIS (to ensure an upper bound
35 analysis of the impacts of the alternatives and of cumulative impacts). Unless market conditions
36 change or advances in solar technology occur, the results of the ReEDS modeling suggest that
37 the RPS-based RFDS levels used in the PEIS analyses are likely over-estimates of solar
38 development through 2030.
39

40 The state-specific RFDS levels are presented in Table 2.4-2. The RFDS levels were also
41 used to estimate the number of acres of BLM-administered lands and other lands that might be
42 economically developable. Table 2.4-1 presents the state-specific assumed total number of BLM-
43 and non-BLM-administered acres likely to be developed over the next 20 years, based on the
44 assumed RFDS and on a high-end estimated land requirement of 9 acres/MW for development.
45
46

TABLE 2.4-2 Percentage of Available Lands Developed by the BLM Action Alternative Based on Estimated Acres Developed under the RFDS

State	Estimated Acres ^a Developed under the RFDS ^b	Solar Development Program Alternative		SEZ Program Alternative	
		Total Proposed Acres ^a Available ^c	Percentage Developed under the RFDS	Total Proposed Acres ^a Available ^d	Percentage Developed under the RFDS
Arizona	21,816	4,485,944	0.5	13,735	100 ^e
California	138,789	1,766,543	7.9	339,090	40.9
Colorado	19,746	148,072	13.3	21,050	93.8
Nevada	15,309	9,084,050	0.2	171,265	8.9
New Mexico	7,497	4,068,324	0.2	113,052	6.6
Utah	10,971	2,028,222	0.6	19,192	57.2
Total	214,119	21,581,154	1.0	677,384	31.6

^a To convert acres to km², multiply by 0.004047.

^b See Table 2.4-1 for basis for these estimates.

^c See Section 2.2.2.2 for basis for these estimates.

^d See Section 2.2.2.3 for basis for these estimates. For the purpose of the RFDS estimates of development, the entire acreage is used in the calculation of percentage developed; however, some portion will not be developable due to various restrictions.

^e The estimated number of acres developed based on the RFDS projection exceeds the acreage proposed to be available in Arizona under the SEZ program alternative; thus it is assumed that 100% of the SEZs would be developed over the 20-year time frame assessed in this PEIS.

1
2
3 For the evaluation of BLM alternatives, the estimated percentage of BLM-administered
4 lands available for development under the solar energy development program alternative
5 (i.e., about 22 million acres [87,336 km²]) or under the SEZ program alternative (i.e., about
6 677,400 acres [2,741 km²]) that would be developed based on the RFDS projections varies by
7 state. Under the solar energy development program alternative, the overall percentage of lands
8 that would be developed based on the RFDS projections is about 1%, although in Colorado about
9 13% of the available lands potentially would be developed and in California almost 8% of the
10 lands would be developed. Under the SEZ program alternative, the overall percentage of lands
11 that would be developed is approximately 32%; however, it would be significantly higher in
12 Colorado (94%), Utah (57%), and California (41%). In Arizona, the estimated number of acres
13 developed based on the RFDS projection would exceed the acreage proposed to be available in
14 the identified SEZs; therefore, the PEIS analyses assume all of the SEZ acreage would be
15 developed under this alternative over the 20-year time frame assessed.

16
17 The RFDS estimate of development on BLM-administered lands in the six-state study
18 area (23,791 MW) is only about 30% of the development that would occur if all currently active
19 applications for ROW authorizations were approved (active applications total 74,219 MW).

1 However, it is not expected that all active applications will result in ROW authorizations;
2 applications are often terminated either because the developer decides to drop the project or
3 because the BLM determines that the application is not in conformance with land use plan
4 decisions or there is a resource conflict.

5
6 In summary, the RFDS would be applicable to both BLM action alternatives. Note that
7 not all of the lands considered available under either of the BLM action alternatives are likely
8 to be developable, because of various constraints that could be identified during project-specific
9 analyses. This factor is taken into account in the SEZ-specific analyses presented in Chapters 8
10 through 13, which assume that only 80% of the SEZ areas would be developable.¹¹ If the
11 predicted development levels under the RFDS are accurate, development could be constrained in
12 Arizona and Colorado by the amount of land available under the SEZ program alternative.
13 However, as stated in Section 2.2.2.2, new SEZs may be identified in the future to provide
14 additional developable lands.

15
16 Solar development on both BLM- and non-BLM-administered lands (estimated as
17 32,000 MW) is relevant for the evaluation of DOE's alternatives, because DOE may support
18 solar projects on any lands. A small portion of the solar development in the six-state study area
19 would be supported by DOE. However, through emphasizing support of projects researching
20 ways to decrease environmental impacts (e.g., to decrease water consumption or land use), the
21 DOE could influence the course of future solar development such that lower impact technologies
22 would be employed.

23 24 25 **2.5 ALTERNATIVES AND ISSUES CONSIDERED BUT ELIMINATED** 26 **FROM DETAILED ANALYSIS**

27
28 The BLM and DOE considered a number of additional alternatives and issues beyond
29 those described in Sections 2.2 and 2.3 and being fully analyzed in this PEIS. This process
30 included a review of the public comments received during both the initial scoping period held
31 in 2008 (which are summarized in the scoping summary report [DOE and BLM 2008) and the
32 second scoping period held in 2009. (See Chapter 14 for a discussion of the public scoping
33 activities.)

34
35 Many of the suggestions provided through external scoping were incorporated into the
36 Solar PEIS, including, but not limited to, the analysis of mitigation requirements (e.g., allowing
37 only low-water-use technologies; using a specific species, such as jojoba, for revegetation); the
38 exclusion of sensitive areas and, conversely, the development of some sensitive areas with
39 appropriate mitigation; the analysis of a "zone-only" alternative; and focusing development in
40 areas with existing transmission lines and roads to minimize the need for new infrastructure.
41 Recommendations that the agencies analyze various development levels and scenarios were
42 considered in constructing the RFDS analyzed in this PEIS. As discussed in Section 2.4, the

¹¹ SEZ-specific analyses presented in Chapters 8 through 13 have identified a number of potential conflicts that could restrict the amount of land available for development within the SEZs to 80% or less. These findings support the assumption that only 80% of a given SEZ would be developable.

1 agencies elected to evaluate a high development scenario in order to establish an upper bound on
2 potential environmental impacts. Similarly, recommendations that the PEIS evaluate new and
3 evolving solar energy technologies were considered in defining the scope of the PEIS analyses;
4 however, the agencies determined it was appropriate to evaluate only those technologies
5 considered to be technically and economically viable within the 20-year time frame being
6 assessed.

7
8 The following sections discuss other suggestions that were not incorporated into the
9 analyses in the PEIS and the basis for not including them.

12 **2.5.1 Distributed Generation**

14 A number of comments were received during the public scoping period suggesting that
15 the agencies evaluate distributed generation of solar energy resources as opposed to, or in
16 addition to, the development of centralized, utility-scale solar energy facilities. Distributed
17 generation refers to the installation of small-scale solar energy facilities at individual locations
18 at or near the point of consumption (e.g., use of solar PV panels on a business or home to
19 generate electricity for on-site consumption). Distributed generation systems typically generate
20 less than 10,000 kW. Other terms for distributed generation include on-site generation, dispersed
21 generation, distributed energy, and others.

23 As discussed in Section 1.2, current research indicates that development of both
24 distributed generation and utility-scale solar power will be needed to meet future energy needs
25 in the United States, along with other energy resources and energy efficiency technologies
26 (NREL 2010). For a variety of reasons (e.g., upper limits on integrating distributed generation
27 into the electric grid, cost, lack of electricity storage in most systems, and continued dependency
28 of buildings on grid-supplied power), distributed solar energy generation alone cannot meet the
29 goals for renewable energy development. Ultimately, both utility-scale and distributed generation
30 solar power will need to be deployed at increased levels, and the highest penetration of solar
31 power overall will require a combination of both types (NREL 2010).

33 Alternatives incorporating distributed generation with utility-scale generation, or looking
34 exclusively at distributed generation, do not respond to the BLM's purpose and need for agency
35 action in this PEIS. The applicable federal orders and mandates providing the drivers for specific
36 actions being evaluated in this PEIS compel the BLM to evaluate utility-scale solar energy
37 development. As discussed in Section 1.1, the Energy Policy Act of 2005 (Public Law [P.L.]
38 109-58) requires the Secretary of the Interior to seek to approve non-hydropower renewable
39 energy projects on public lands with a generation capacity of at least 10,000 MW of electricity
40 by 2015; this level of renewable energy generation cannot be achieved through distributed
41 generation systems. In addition, Order 3285A1 issued by the Secretary of the Interior requires
42 the BLM and other Interior agencies to undertake multiple actions to facilitate large-scale solar
43 energy production (Secretary of the Interior 2010). Accordingly, the BLM's purpose and need
44 for agency action in this PEIS is focused on the siting and management of utility-scale solar
45 energy development on public lands (see Section 1.3). Furthermore, the agency has no authority

1 or influence over the installation of distributed generation systems, other than on its own
2 facilities, which the agency is evaluating at individual sites through other initiatives.

3
4 The evaluation of distributed generation systems does fall within the scope of DOE's
5 mission; however, it is being handled in other initiatives separate from this PEIS. DOE
6 recognizes that the present electric grid, built decades ago, was based on a centralized
7 generation approach and was not designed to handle high levels of distributed renewable
8 energy systems. In 2007, DOE launched the Renewable Systems Interconnection (RSI) study
9 to identify the technical and analytical challenges that must be addressed to enable high
10 penetration levels for distributed energy systems, with a particular emphasis on solar PV
11 systems (see <http://www1.eere.energy.gov/solar/rsi.html>). As a result of the RSI study, in 2008,
12 DOE initiated the Solar Energy Grid Integration Systems (SEGIS) program to further enhance
13 distributed PV systems. Through these efforts, DOE is actively pursuing the expansion of
14 distributed generation systems and their contribution to the country's electricity supply. While
15 distributed generation of solar energy clearly is an important component of DOE's Solar Energy
16 Technologies Program, inclusion in this analysis of an alternative incorporating distributed
17 generation does not address the DOE's purpose and need to satisfy both Executive Orders
18 (E.O.s) and respond to this congressional mandate and promote, expedite, and advance the
19 production and transmission of environmentally sound energy resources, including renewable
20 energy resources and, in particular, cost-competitive solar energy systems at the utility scale
21 (see Section 1.4.1).

22 23 24 **2.5.2 Conservation and Demand-Side Management**

25
26 Like the requests for distributed generation alternatives, recommendations that the
27 BLM and DOE evaluate alternatives incorporating conservation of energy and demand-side
28 management do not respond to the purpose and need for agency action in this PEIS. In general,
29 conservation initiatives would be designed to reduce energy consumption levels in order to
30 reduce the need for increased electricity generation capacity. Demand-side management would
31 involve specific actions taken by utilities, their regulators, and other entities to induce, influence,
32 or compel consumers to reduce their energy consumption, particularly during periods of peak
33 demand.

34
35 While these types of initiatives are important components of the country's efforts to
36 address future energy needs, they do not respond to the purpose and need for agency action in
37 this PEIS as defined by the agencies (see Sections 1.3 and 1.4). These efforts are beyond the
38 scope of the BLM's land management responsibilities. Other programs within the DOE Office
39 of Energy Efficiency and Renewable Energy focus on both conservation and demand-side
40 management.

41 42 43 **2.5.3 Analysis of Life-Cycle Impacts of Solar Energy Development**

44
45 Several comments were submitted suggesting that this PEIS should address impacts
46 associated with the life cycle of solar energy development, including the manufacturing of solar

1 facility components. The action agencies recognize that consideration of life-cycle impacts will
2 provide valuable information supporting energy policy development in this country. However,
3 the impacts associated with other solar energy life-cycle activities were not determined to be
4 connected actions for the purposes of this PEIS (Title 40, Part 1808.25(a)(1) of the *Code of*
5 *Federal Regulations* [40 CFR 1508.25(a)(1)]). As appropriate, these types of activities would be
6 addressed as part of the cumulative effects analysis in project-specific environmental reviews.
7

8 For DOE, life-cycle analysis of energy development is an important research topic. Such
9 analyses are being conducted by DOE across its programs, including life-cycle analyses for solar
10 energy technologies.
11

12 **2.5.4 Analysis of Development on Other Federal, State, or Private Lands**

13 Comments were received suggesting that the scope of the PEIS include evaluation of
14 development on other federal lands (e.g., lands managed by the U.S. Department of Defense),
15 state lands, and private lands. A related suggestion was to sell BLM-administered public land
16 to the private sector and limit all utility-scale solar power facilities to only private land.
17 Alternatives based on these suggestions do not respond to the purpose and need for agency
18 action in this PEIS and would not meet the objectives established for the BLM by the Energy
19 Policy Act of 2005 and Secretarial Order 3285A1, both of which require the BLM to facilitate
20 renewable energy development on public lands. As discussed in Section 1.3.5, the BLM has
21 indicated that the agency may decide to dispose of some parcels of land to support the
22 development of solar energy development. These decisions would be made on a case-by-case
23 basis, however.
24
25
26

27 It is also important to point out that the analysis of solar energy development on other
28 federal or private lands is encompassed in the scope of the PEIS analysis. The geographic scope
29 of DOE's analysis includes all lands in the six-state study area. As discussed in Section 1.4.1,
30 DOE may support solar projects on all types of lands, including BLM-administered lands
31 and other federal, state, Tribal, and private lands. The description of the affected environment
32 in Chapter 4 and the results of the analysis of potential impacts and mitigation measures in
33 Chapter 5 may be applicable, as appropriate, across all lands within the study area. Because the
34 scope of Chapters 4 and 5 encompasses all lands within the six-state study area, parties other
35 than the BLM and DOE may be able to use the information in this PEIS to support their own
36 analyses of utility-scale solar energy development in this area.
37
38

39 **2.5.5 Restricting Development to Previously Disturbed Lands**

40 A number of comments suggested that the agencies limit utility-scale solar energy
41 development to lands that have been "previously disturbed." This issue has not been incorporated
42 into the PEIS as an independent alternative; however, consideration was given to previously
43 disturbed lands in identifying areas best suited to solar energy development. While there is no
44 clear and well-established definition of what constitutes "previously disturbed public lands," nor
45 are there any clearly defined thresholds for determining when lands cannot be restored to their
46

1 former, undeveloped state, the BLM identified some lands within SEZs as particularly well
2 suited for solar development because previous human or natural disturbance had occurred on
3 those lands. In addition, a proposed design feature requires projects to be sited on previously
4 disturbed lands, to the extent practicable.
5

6 As discussed in Section 1.6.2.4, separate from the Solar PEIS, the BLM Arizona State
7 Office, through its Restoration Design Energy Project (launched in April 2010), is taking steps to
8 identify disturbed or previously disturbed sites in Arizona that can be made available for
9 renewable energy projects (http://www.blm.gov/az/st/en/prog/energy/arra_solar.html). That
10 initiative is not limited to public lands, but also includes private lands. Identified sites will be
11 evaluated in terms of their restoration potential, potential for other land use, and technical
12 suitability for renewable energy development. In the future, the BLM may implement similar
13 programs in other states. In addition, the U.S. Environmental Protection Agency has launched
14 the RE-Powering America's Land initiative to promote the siting of renewable energy production
15 facilities on contaminated land (see <http://www.epa.gov/renewableenergyland/index.htm>);
16 however, the types of contaminated properties it has identified are not likely to coincide
17 substantially with BLM-administered public lands.
18

19 From DOE's perspective, it may elect to establish programmatic guidance that promotes
20 utility-scale solar development on previously disturbed lands.
21
22

23 **2.5.6 Restricting Development to Populated Areas** 24

25 Suggestions also were made to restrict solar energy development to areas near population
26 centers. While this issue has not been incorporated into the PEIS as an independent alternative,
27 consideration was given to proximity of available lands to existing infrastructure such as
28 transmission lines. Some of the proposed SEZs are located close to population centers. The
29 Solar PEIS also analyzes the social, economic, and environmental impacts of constructing and
30 operating solar energy facilities that may be located away from population centers.
31

32 From DOE's perspective, it may elect to establish programmatic guidance that promotes
33 utility-scale solar development near populated areas.
34
35

36 **2.5.7 Restricting Development to the Fast-Track Project Applications** 37

38 Comments were received requesting that the BLM evaluate an alternative under which
39 development on BLM-administered lands would be limited to the 14 proposed fast-track solar
40 projects. These projects would be located in three states and would have a total electricity
41 generating capacity of about 6,022 MW (see Section 1.3.3).¹² This alternative was not

¹² Six fast-track projects have been approved in California and two have been approved in Nevada: BrightSource Energy's Ivanpah Solar Electric Generating System, Tessera Solar's Imperial Valley and Calico Solar Projects, Chevron Energy Solution's Lucerne Valley Solar Project, NextEra's Genesis Ford Dry Lake Solar Project, Solar Millennium's Blythe and Amargosa Farm Road Solar Projects, and First Solar's Silver State North Solar Project.

1 considered for several reasons. While the fast-track projects would contribute to the goal of
2 10,000 MW of electricity generated from renewable energy projects located on public lands as
3 set forth in the Energy Policy Act of 2005, an alternative limiting solar development to these
4 projects would not meet the requirements of Secretarial Order 3285A1 to identify and prioritize
5 locations best suited for large-scale production of solar energy on public lands. Limiting
6 development to BLM-administered lands included in fast-track applications would completely
7 exclude development on BLM-administered lands in three of the states included in this
8 assessment (Colorado, New Mexico, and Utah). This restriction would arbitrarily limit solar
9 development on BLM-administered lands over the next 20 years. Finally, since the fast-track
10 projects are still in the environmental review phase, it is possible that some may not be approved
11 or may be approved at a reduced capacity.

14 **2.5.8 Analysis of Development on the Maximum Amount of Public Lands Allowable**

16 Under both of the action alternatives being evaluated by the BLM in this PEIS, the
17 BLM is considering restricting utility-scale solar energy development from lands where it has
18 determined such development is incompatible with existing resources, resource uses, and special
19 designations. These discretionary exclusions are listed in Section 2.2.2.2. The BLM has decided
20 not to evaluate a maximum lands alternative that would make some or all of these potentially
21 sensitive lands available for application for solar energy development, because it believes that
22 ROW authorizations for solar energy development would not be approvable in these areas given
23 existing resource protections. Utility-scale solar energy development requires that large parcels
24 of land be converted to a single-use, with a year-round dominance over other potential uses of
25 the land and long-term commitment of resources. These conditions are inherently in conflict with
26 the important resources, resource uses, and special designations on some BLM-administered
27 lands.

29 In determining which lands should be excluded from solar energy development, the
30 BLM also has decided to not make lands available for application for solar energy development
31 where the slope is equal to or greater than 5% or where the solar insolation level is less than
32 6.5 kWh/m²/day. As discussed in Section 2.2.2.2, the solar technologies evaluated in the PEIS
33 are limited in terms of the slope of the land on which they can be constructed, with 5% slope
34 being a reasonable upper limit. The rationale for restricting the available lands based on the solar
35 insolation level is to maximize the efficient use of BLM-administered lands and meet the
36 multiple use intent of FLPMA by reserving for other uses lands that are not ideal for solar energy
37 development.

39 On a related note, one commenter suggested that the PEIS should evaluate solar
40 energy development in Wilderness Areas. This suggestion was not incorporated into any
41 of the BLM's alternatives because such development is prohibited by law and, therefore,
42 is not appropriate to analyze.

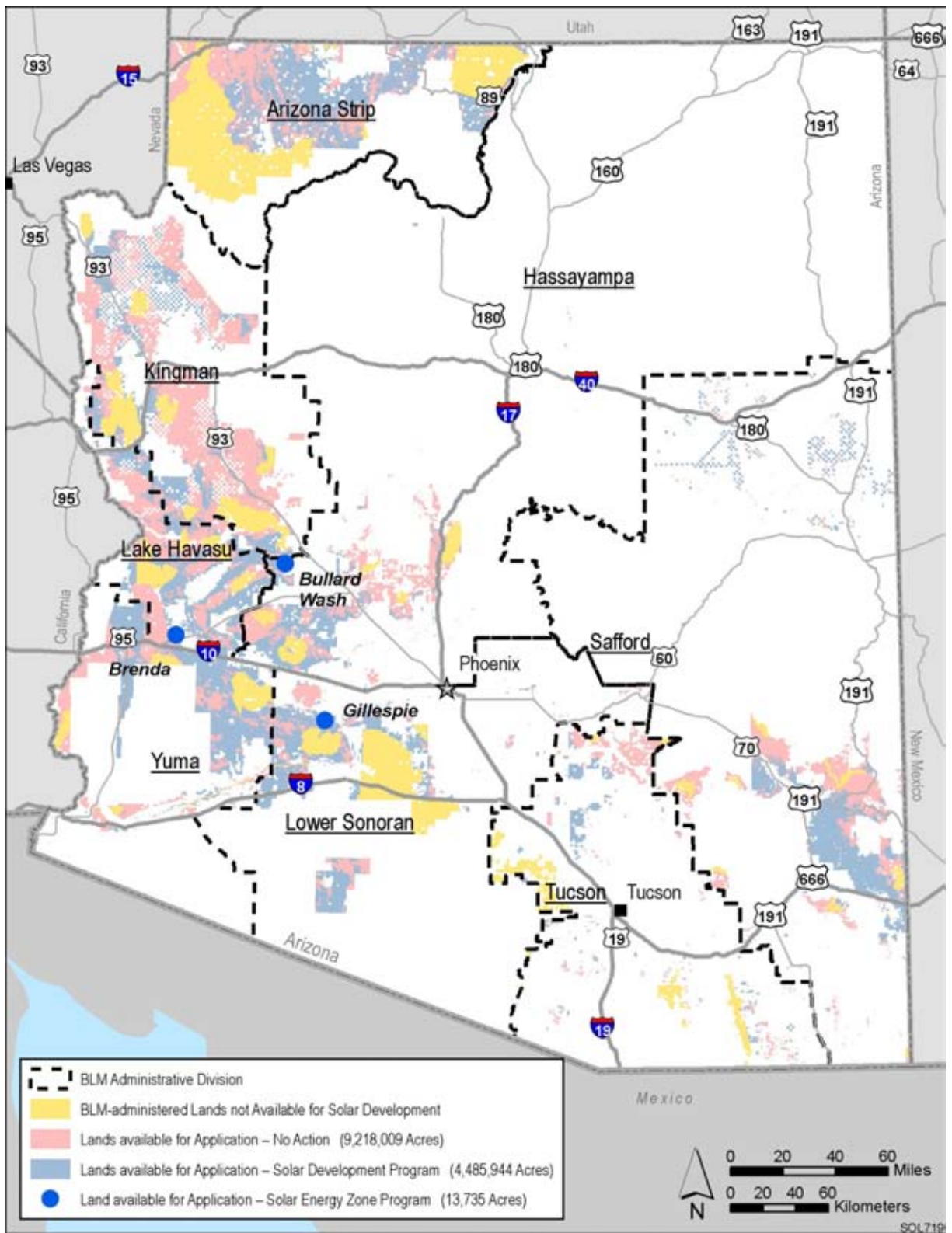
1 **2.5.9 Changes to BLM’s Proposed Solar Energy Zones**
2

3 Several commenters requested evaluation of different and/or additional locations to the
4 BLM’s proposed SEZs. As discussed in Section 2.2.2.2, suggestions to modify the boundaries of
5 the proposed SEZs were considered, along with input from BLM state and field office staff, in
6 defining the areas proposed and evaluated in the PEIS. Modifications were made to SEZs in
7 each of the six states; a detailed description of these modifications is included in the SEZ-
8 specific sections in Chapters 8 through 13.
9

10 Suggestions to include additional SEZs were considered. However, because the site-
11 specific evaluation of SEZs requires a large amount of data and lengthy evaluation time, the
12 BLM decided to not include additional proposed SEZs in order to reduce impacts on the PEIS
13 schedule. As discussed in Section 2.2.2.2, the BLM may evaluate additional SEZs in the future,
14 using a process similar to that employed in this PEIS.
15

16
17 **2.5.10 Other Suggested Alternatives**
18

19 A few suggestions regarding alternatives to be analyzed in the Solar PEIS were
20 determined to be beyond the scope of the DOE’s and the BLM’s purpose and need for agency
21 action in this PEIS, as defined by the agencies. While certainly worthy of analysis, suggestions to
22 also evaluate other electricity generation technologies (e.g., coal, nuclear, natural gas,
23 geothermal, and wind) and compare the relative impacts and benefits of these alternatives were
24 determined to be beyond the scope of this PEIS. In addition, suggestions to evaluate hauling ice
25 from outside the study area to supply water for solar power facilities and to site solar power
26 facilities in space were considered to be out of scope.
27
28



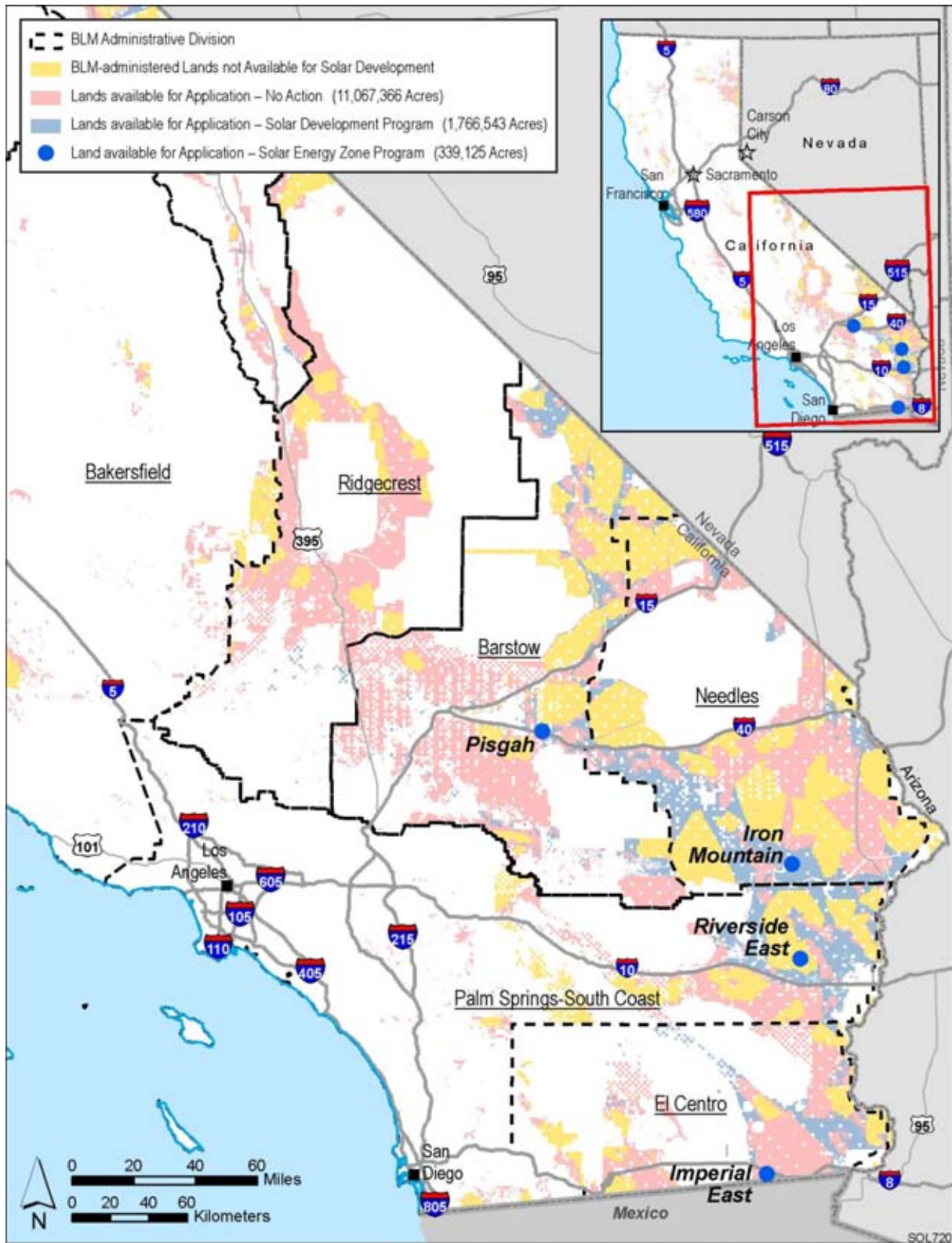
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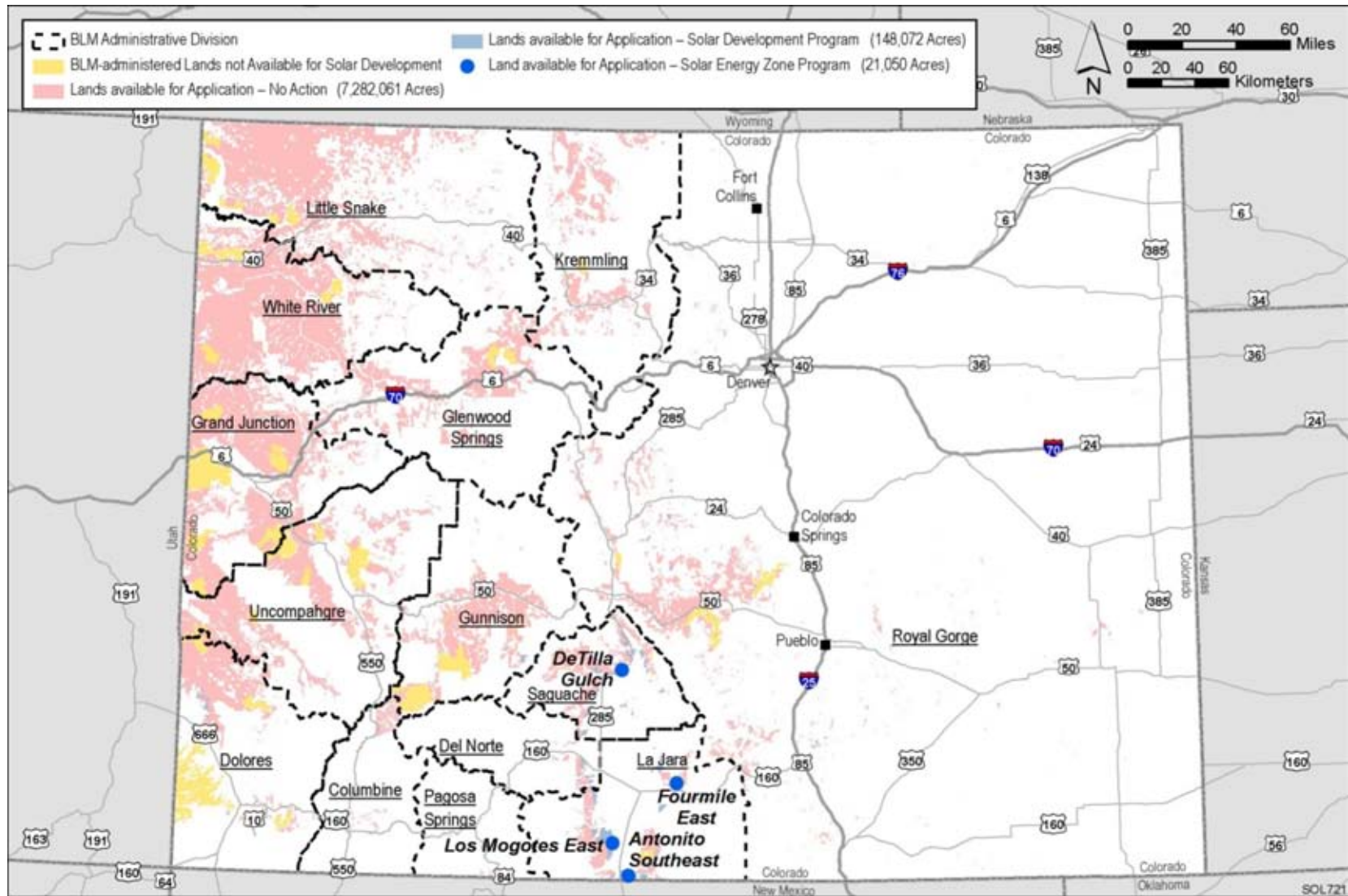
4

FIGURE 2.2-1 BLM-Administered Lands in Arizona Available for Application for Solar Energy ROW Authorizations under the BLM Alternatives Considered in This PEIS (Note: The lands available under the no action alternative include both the pink and blue shaded areas.)



1

2 **FIGURE 2.2-2 BLM-Administered Lands in California Available for Application for Solar**
 3 **Energy ROW Authorizations under the BLM Alternatives Considered in This PEIS (Note: The**
 4 **lands available under the no action alternative include both the pink and blue shaded areas.)**



1
2 **FIGURE 2.2-3 BLM-Administered Lands in Colorado Available for Application for Solar Energy ROW Authorizations under the**
3 **BLM Alternatives Considered in This PEIS (Note: The lands available under the no action alternative include both the pink and**
4 **blue shaded areas.)**

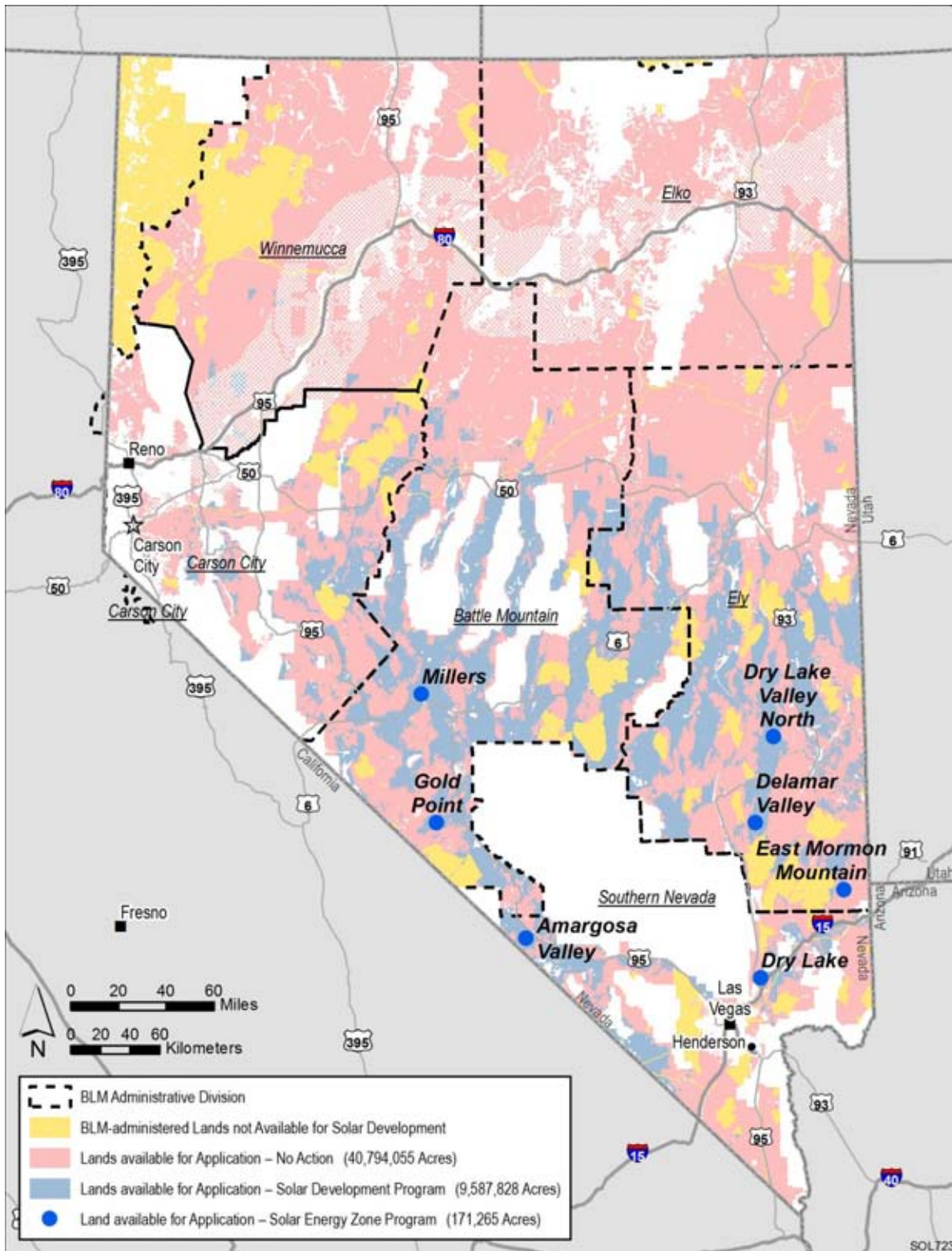


FIGURE 2.2-4 BLM-Administered Lands in Nevada Available for Application for Solar Energy ROW Authorizations under the BLM Alternatives Considered in This PEIS (Note: The lands available under the no action alternative include both the pink and blue shaded areas.)

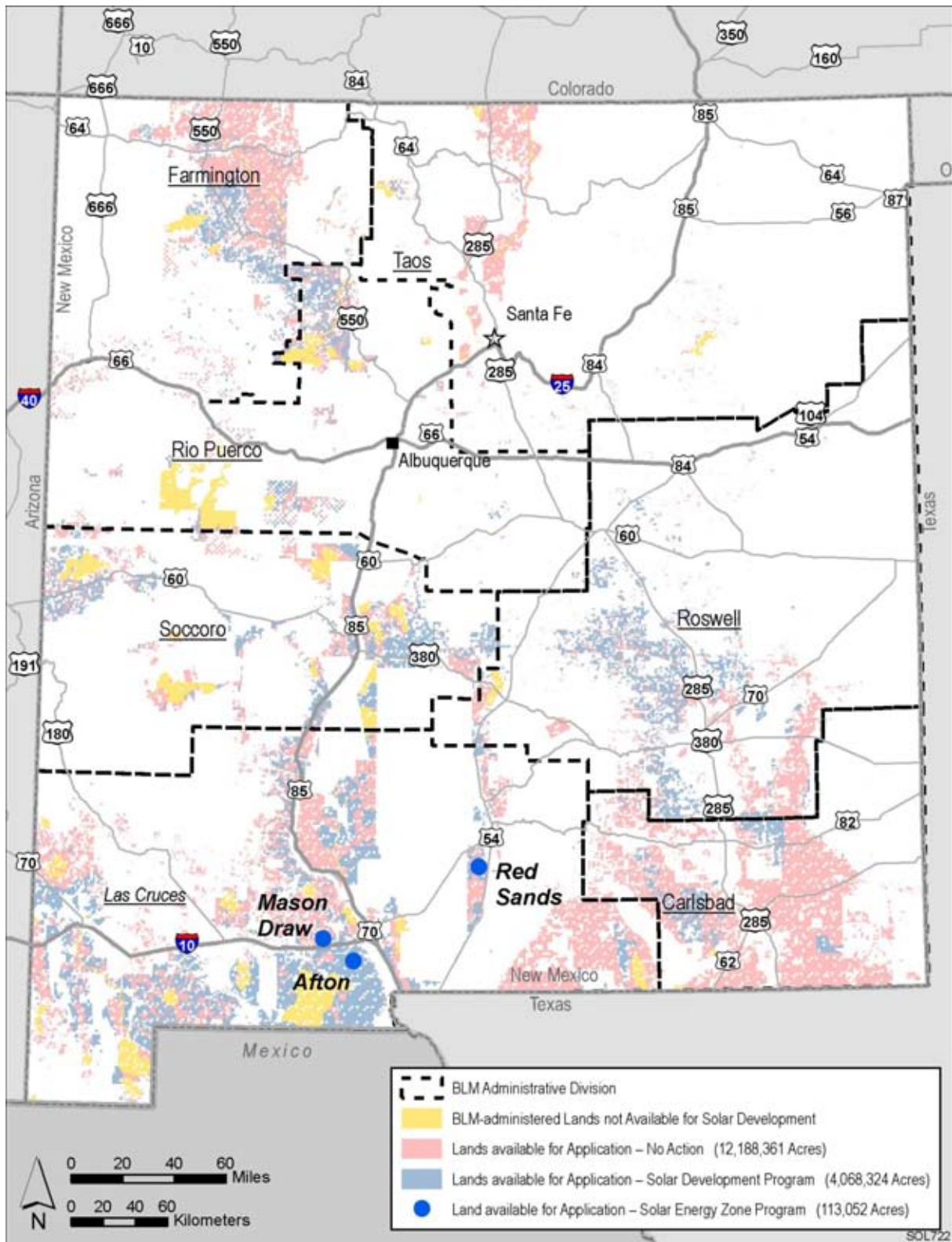
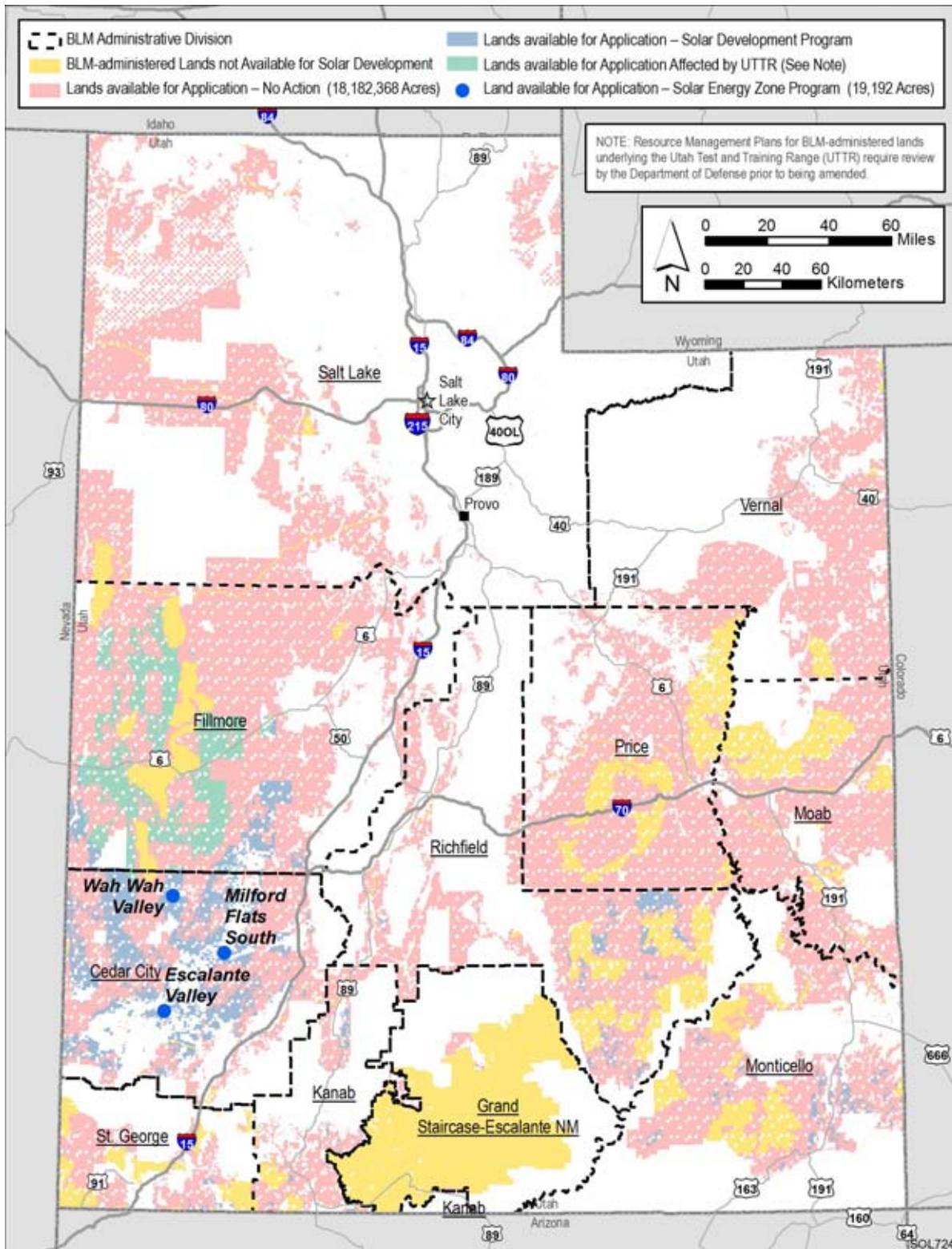


FIGURE 2.2-5 BLM-Administered Lands in New Mexico Available for Application for Solar Energy ROW Authorizations under the BLM Alternatives Considered in This PEIS (Note: The lands available under the no action alternative include both the pink and blue shaded areas.)



1

2 **FIGURE 2.2-6 BLM-Administered Lands in Utah Available for Application for Solar Energy**
 3 **ROW Authorizations under the BLM Alternatives Considered in This PEIS (Note: The lands**
 4 **available under the no action alternative include both the pink and blue shaded areas.)**

1 **2.6 REFERENCES**

2
3 *Note to Reader:* This list of references identifies Web pages and associated URLs where
4 reference data were obtained for the analyses presented in this PEIS. It is likely that at the time
5 of publication of this PEIS, some of these Web pages may no longer be available or their URL
6 addresses may have changed. The original information has been retained and is available through
7 the Public Information Docket for this PEIS.

8
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26
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