BLM

Regional Mitigation Strategy for the Colorado Solar Energy Zones

Final Report

Prepared by:
Bureau of Land Management
January 2017

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Prepared by:
U.S. Department of the Interior
Bureau of Land Management

and

Environmental Science Division
Argonne National Laboratory

January 2017

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NOTATION

ACRONYMS, INITIALISMS, AND ABBREVIATIONS

AAQS	Ambient Air Quality Standards
ACEC	Area of Critical Environmental Concern
AGL	Above Ground Level
AIM	Assessment, Inventory, and Monitoring
Argonne	Argonne National Laboratory, Environmental Science Division
AUM	Animal Unit Month
BLM	Bureau of Land Management
CCCW	Conejos County Clean Water
CE	Conservation Element
CNHP	Colorado Natural Heritage Program
CPW	Colorado Parks & Wildlife
CTSR	Cumbres & Toltec Scenic Railroad
DOE	Department of Energy
DOI	Department of the Interior
DoW	Defenders of Wildlife
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	Environmental Protection Act
ESA	Endangered Species Act
EVT	Existing Vegetation Types
FLPMA	Federal Land Policy & Management Act of 1976
FS	Forest Service
GIS	Geographic Information System
GMP	General Management Plan
IDT	Interdisciplinary Team
LA	Landscape Assessment
LPI	Line Point Intercept
LWCF	Land & Water Conservation Fund
LWC	Lands with Wilderness Characteristics
MQ	Management Question
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Protection Act

NF	National Forest
NHA	National Heritage Area
NHL	National Historic Landmarks
NHT	National Historic Trail
NP	National Park
NPS	National Park Service
OHV	Off Highway Vehicle
OST	Old Spanish Trail
PEIS	Programmatic Environmental Impact Statement
PFYC	Potential Fossil Yield Classification
PM	Particulate Matter
PV	Photovoltaic
RGNA	Rio Grande Natural Area
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right of Way
SDA	Specially Designated Area
SEZ	Solar Energy Zone
SHPO	State Historic Preservation Office
SLV	San Luis Valley
SLVEC	San Luis Valley Ecosystem Council
SRMA	Special Recreation Management Area
SRMS	Solar Regional Mitigation Strategy
SSS	Special Status Species
TMP	Travel Management Plan
TNC	The Nature Conservancy
TWS	The Wilderness Society
USFWS	United States Fish & Wildlife Service
VRI	Visual Resources Inventory
VRM	Visual Resource Management
WA	Wilderness Area
WSA	Wilderness Study Area

UNITS OF MEASURE

cm	centimeter(s)
ft	foot (feet)
km^2	square kilometers(s)
m	meter(s)

UNIT CONVERSIONS

1 km^2	0.39 mi^2
1 m	3.28 ft

ABSTRACT

This Regional Mitigation Strategy for the Colorado Solar Energy Zones (Strategy or Solar RMS) presents the Bureau of Land Management (BLM) reasoning and recommendations for compensatory mitigation of solar energy development in Colorado solar energy zones (SEZs) and recommends a plan of action for the approximate period 2017-2030. The BLM Strategy was developed with Argonne National Laboratory under Federal Land Policy and Management Act (FLPMA, 1976) principles of multiple use and sustained yield. The Strategy evaluates compensatory mitigation in terms of unavoidable (or residual) impacts and compensatory mitigation measures at the site- (~13,000 acres) and landscape- (~6.5 million acres) scales in the San Luis Valley – Taos Plateau Ecological Subregion. The Strategy has been prepared in advance of anticipated land use activities and residual impacts at three SEZs in Conejos and Saguache Counties, Colorado: the Antonito Southeast SEZ (about 9,700 acres), De Tilla Gulch SEZ (about 1,060 acres), and Los Mogotes East SEZ (about 2,500 acres).

This Strategy implements Department of the Interior (DOI) policy (DOI 2015) regarding development of SEZ regional compensatory mitigation strategies as part of the BLM Solar Energy Program or *Western Solar Plan* established through the "Approved Resource Management Plan Amendments/Record of Decision for Solar Energy Development in Six Southwestern States" (Solar PEIS ROD, October 2012). The Strategy aims to foster future SEZ leasing and streamlined project-specific analysis of operator plans of development under the National Environmental Policy Act (NEPA). The Strategy advances departmental policy to improve mitigation practices and procedures including public and stakeholder engagement in developing compensatory mitigation options for future decisions by BLM that consider landscape-level resource conditions and trends and the residual effects of large solar facilities (> 20 MW) for each of the SEZs (Secretary of the Interior Order 3330, October 2013).

This Strategy was completed following public and stakeholder engagement during the period 2014-2015 and consists of BLM findings and recommendations regarding : (1) the residual impacts of utility-scale solar development in the Colorado SEZs that may warrant regional compensatory mitigation; (2) mitigation actions that can be implemented in the region and landscape to compensate for those impacts; (3) how appropriate compensatory mitigation obligations could be valued and calculated; and (4) how the impacts and mitigation actions would be monitored.

While the Strategy for the Colorado SEZs is not a BLM decision, it includes specific recommendations to inform future BLM decisions, including but not limited to: a) recommendations for additional non-development areas within the SEZs, b) conditions for future SEZ leasing, including project-specific NEPA evaluation of impacts warranting compensatory mitigation in the region and where and how regional compensatory mitigation might occur; and c) recommended requirements for monitoring and adaptive management to measure and ensure mitigation effectiveness.

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1 INTRODUCTION AND PURPOSE

1.1 Purpose of the Strategy

The Bureau of Land Management (BLM) developed this Regional Mitigation Strategy for the Colorado Solar Energy Zones (Strategy or Solar RMS) to meet two objectives. The BLM's first objective is to preliminarily assess the unavoidable (or residual) impacts associated with utility-scale solar energy development in three solar energy zones (SEZs) in southern Colorado, and to inform stakeholders of that assessment. The Strategy includes the BLM Interdisciplinary Team's assessment and recommendations, in consideration of stakeholder input, concerning the residual impacts of SEZ development that may warrant compensation. Unavoidable or "residual impacts" are those adverse impacts that would remain after the application of avoidance and minimization measures.

The BLM's second objective is to use a landscape-based approach, based on best available data, to make recommendations regarding compensatory mitigation options for certain residual impacts that can be reasonably expected from utility-scale solar development in the SEZs. The Strategy is not a decision. Rather, the Strategy includes findings and recommendations for BLM reference when conducting analyses and decision-making relating to future SEZ development.

The three SEZs assessed by BLM Colorado and New Mexico and Argonne National Laboratory (Argonne) are: Antonito Southeast SEZ (Conejos County), De Tilla Gulch SEZ (Saguache County), and Los Mogotes East SEZ (Conejos County).[1] When evaluating these areas, the BLM identified and assessed residual impacts at a landscape-scale in relation to the *San Luis Valley-Taos Plateau* Level IV ecoregion, defined as the study area.[2] The potential residual impacts on this study area in relation to its overall resource values, conditions, and trends are evaluated (Walston et al. 2016; Wescott et al. 2016).

Under the Federal Land Policy and Management Act (FLPMA, 1976), the BLM manages public lands in accordance with multiple use and sustained yield principles, which include appropriately maintaining the quality of ecological and other environmental and cultural values (many of these values are also termed "ecosystem services", which are benefits that humans receive from ecosystems) and managing resources without permanent impairment of the productivity of the land. While contributing to low carbon forms of energy generation, utility-scale solar development on the three BLM CO SEZ's has the potential to encompass an extensive surface area, convert wildlife habitat, disturb water recharge, contribute to atmospheric dust, modify views, and involve a long-term commitment of resources. Per DOI mitigation policy (DOI 2015) and BLM's policy on regional mitigation (Manual Section 1794; BLM 2016), BLM considers the mitigation hierarchy to avoid, minimize, rectify, reduce over time, or compensate the direct, indirect, and cumulative impact of SEZ development.

While the BLM places a priority on avoiding and minimizing impacts, such measures may not be sufficient. Therefore, the BLM is considering compensatory mitigation for those residual impacts that warrant regional compensatory mitigation. Accordingly, this Strategy provides:

[1] A fourth SEZ in Colorado, the Fourmile East SEZ, is not included in this evaluation. Background information and discussion of a BLM Colorado Front Range District recommendation on this SEZ is provided in Section 1.3.

[2] The ecoregion study area was selected to represent regional conditions in the area encompassing the SEZs. Ecoregions are defined by the U.S. Environmental Protection Agency as areas of general similarity in the type, quality, and quantity of environmental resources.

1. A summary of reasonably foreseeable residual impacts, including direct, indirect, or cumulative impacts, as a result of development of the Antonito Southeast, De Tilla Gulch, and Los Mogotes East SEZs (Appendix A).

2. Regionally important conditions and trends as characterized in the BLM San Luis Valley-Taos Plateau Level IV Ecoregion Landscape Assessment (Walston et al. 2016), and the Landscape-Level Cultural Heritage Values and Risk Assessment (Wescott et al. 2016) (Section 2.1.5.2).

3. Conceptual models that depict the relationships between resources, ecosystem functions and services, and change agents (including human development and use, climate change, wildfire, and invasive species) (Section 2.4.3.2.1; Appendix B).

4. The residual impacts that may warrant regional compensatory mitigation considering their degree or magnitude, landscape context, resource function and trends, and the roles that the impacted resources play (Section 2.4.3.2.2; Appendix C).

5. Regional or landscape goals and objectives, including those recommended in the applicable land use plans, and a range of desired SEZ mitigation site outcomes (Section 2.5).

6. A recommended method for calculating a regional compensatory mitigation obligation that could be assessed to developers choosing to contribute to a mitigation fund, and an explanation of how it was calculated for the Colorado SEZs. Also, the strategy includes the estimated cost of regional compensatory mitigation actions, including acquisition, restoration costs, and management costs to ensure effectiveness, additionality, and durability (Section 2.6).

7. Preliminary information on management of mitigation obligation revenues derived from development of the Colorado SEZs (Section 2.7).

8. Recommended regional compensatory mitigation sites, actions, and desired outcomes for the Colorado SEZs to contribute to achieving the regional goals and objectives (Section 2.8).

9. Discussion of how the mitigation outcomes should be monitored and what will happen if the actions are not achieving the desired results (Section 2.9).

The BLM authorized officer will make a determination of compensatory mitigation requirements for each SEZ prior to issuing the lease and notice to proceed and will also take into consideration:

- The National Environmental Policy Act (NEPA) analysis done for the lease sale (termed "pre-auction NEPA), project permitting, and mitigation alternatives, including opportunity for public and stakeholder participation and comments.

- Any changes to the applicable resource management plans (RMPs) or other plans that affect management of the SEZs or possible mitigation sites.

- The input received from Government-to-Government consultation with tribes.

- Any other information that would update, correct, or otherwise supplement the information contained in this strategy.

1.2 Background

In 2012, the BLM and the U.S. Department of Energy published the "Final Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development in Six Southwestern States" (Final Solar PEIS; BLM and DOE 2012). The Final Solar PEIS assessed the impact of utility-scale solar energy development on public lands in the six southwestern states of Arizona, California, Colorado, Nevada, New Mexico, and Utah. The Solar PEIS evaluated the impacts of the most established solar technologies at that time, including photovoltaic, parabolic trough, and power tower technologies, and presented a detailed analysis of the expected impacts of solar development within each of seventeen priority areas for development (solar energy zones or SEZs). The "Approved Resource Management Plan Amendments/Record of Decision (ROD) for Solar Energy Development in Six Southwestern States" (Solar PEIS ROD, also called the Western Solar Plan) implemented a comprehensive solar energy program for public lands in those states and incorporated land use allocations and programmatic and SEZ-specific design features into land use plans in the six-state study area (BLM 2012a). Four SEZs were identified in Colorado's San Luis Valley (SLV), encompassing approximately 16,300 acres (66 km^2). Solar development within SEZs is expected to occur through the issuance of competitive leases.[3]

Comments on both the Draft Solar PEIS and the Supplement to the Draft Solar PEIS encouraged the BLM to incorporate a robust mitigation framework and landscape-based approach into the solar energy program, to address any residual impacts expected to result from solar development in the SEZs despite avoidance of many impacts and the implementation of design features to minimize impacts. Such a framework would seek to achieve strategic offset conservation or other compensatory outcomes while addressing residual impacts expected as a result of solar development in the SEZs. In the Supplement to the Draft Solar PEIS, and in the Final Solar PEIS, the BLM presented a draft framework for regional mitigation planning.[4]

This solar regional mitigation strategy (SRMS) supports the implementation of the BLM's commitment to 1) strategize for regional compensatory mitigation (Solar PEIS ROD; BLM 2012a), 2) implement the mitigation hierarchy according to Departmental policy (DOI 2015) and BLM's policy on regional mitigation (Manual Section 1794; BLM 2016), and 3) implement Secretarial Order 3330 (2013). The DOI and BLM mitigation policies require DOI agencies (and specifically, BLM) to consider reasonable mitigation measures, which can consist of avoidance, minimization, rectification, reduction or elimination of impacts over time, or compensation (i.e., the mitigation hierarchy[5]) (DOI 2015). The BLM's implementation of the mitigation hierarchy as defined in the solar energy program begins with the location and configuration of the SEZs, which helps to avoid resource conflicts. Avoidance is also used within the boundaries of SEZs by identifying non-development areas. Minimization involves the

[3] In November 2016, the BLM issued a final rule defining competitive processes, terms, and conditions for leasing public lands for solar and wind energy development. Land grants within SEZs will be issued competitively as leases, rather than through non-competitive rights-of-way grants. The new rule became effective on December 19, 2016, 30 days after its publication in the Federal Register.

[4] In the Final Solar Energy PEIS (BLM and DOE 2012), Appendix A, Section A.2.5, the BLM refers to solar regional mitigation plans (SRMPs). To be consistent with guidance issued in the subsequent BLM Instruction Memorandum 2017-021 (BLM 2016), the BLM herein adopts the terminology of solar regional mitigation strategy (SRMS, or Strategy as shorthand).

[5] Throughout this document, the terminology of avoidance and minimization may be used to also refer to other parts of the mitigation hierarchy, specifically rectification and reduction or elimination of impacts over time.

implementation of design features (such as those required by the Solar PEIS ROD) and management practices meant to reduce the impacts. The Solar PEIS analyzed the impacts of solar development that incorporated a robust suite of design features. The Solar PEIS ROD adopted this robust set of both programmatic and SEZ-specific design features into the BLM's solar energy program to minimize some of the expected impacts of development onsite. All mandatory design features will be required to be incorporated into the terms and conditions of leases for solar energy generation projects within SEZs.

This SRMS builds on the avoidance and minimization requirements identified in the Solar PEIS ROD,[6] and therefore focuses on the last aspect of the mitigation hierarchy, compensatory mitigation. Compensatory mitigation is evaluated by the BLM based on the need to address residual impacts to resources (i.e., those impacts that cannot be avoided or minimized; also referred to as "unavoidable impacts"). Figure 1-1 illustrates how mitigation measures identified in the Solar PEIS ROD, including design features, are carried forward and are included, to the extent they apply, in project-specific NEPA conducted following a submission of an application by a developer. It is important to note that avoidance of resource impacts was included in designating the SEZs. Table 1-1 illustrates the context of the per acre mitigation fee recommended in this SRMS document in comparison to other fees and costs to be borne by the project developer through time. The fees and costs include rental and nameplate capacity fees, costs for implementing design features to accomplish onsite mitigation, compensatory mitigation fees, and bonding costs for reclamation of the project site following decommissioning.

This SRMS consists of recommendations to compensate for some of the residual impacts that will remain after avoidance and minimization measures are taken. One major focus of this regional compensatory mitigation strategy is to recommend a mitigation fee to be paid by the developer that will offset those residual impacts and identify a suite of mitigation actions and locations, depending on project-specific details, to invest mitigation fees to achieve mitigation goals and objectives, including effectiveness, feasibility, durability, and additionality. The SRMS differs from project-level compensatory mitigation development that has been conducted historically by the BLM. Specifically, the BLM describes regional goals, measurable landscape objectives, desired mitigation outcome options, actions, and sites as developed with public and stakeholder engagement in advance of project-specific analyses. This SRMS references conditions and trends of various resources in the context of the larger landscape,[7] identifies the desired outcomes for compensatory mitigation measures in the context of regional goals and objectives, and includes the outline for a comprehensive protocol for monitoring the compensatory mitigation actions. This strategy is intended to increase permit efficiencies and financial predictability for developers in SEZs by increasing certainty around mitigation requirements and costs.

Concurrent with the development of this SRMS, BLM Colorado supported the development of several studies designed to provide additional information on potential impacts of solar development (i.e., a visual resource analysis [Sullivan et al. 2016], a dust impact study [Chang et al. 2016], and studies on regional trends for ecological and cultural resources [Walston et al. 2016; Wescott et al. 2016]). Information from these studies has been incorporated into the analyses conducted as part of this SRMS.

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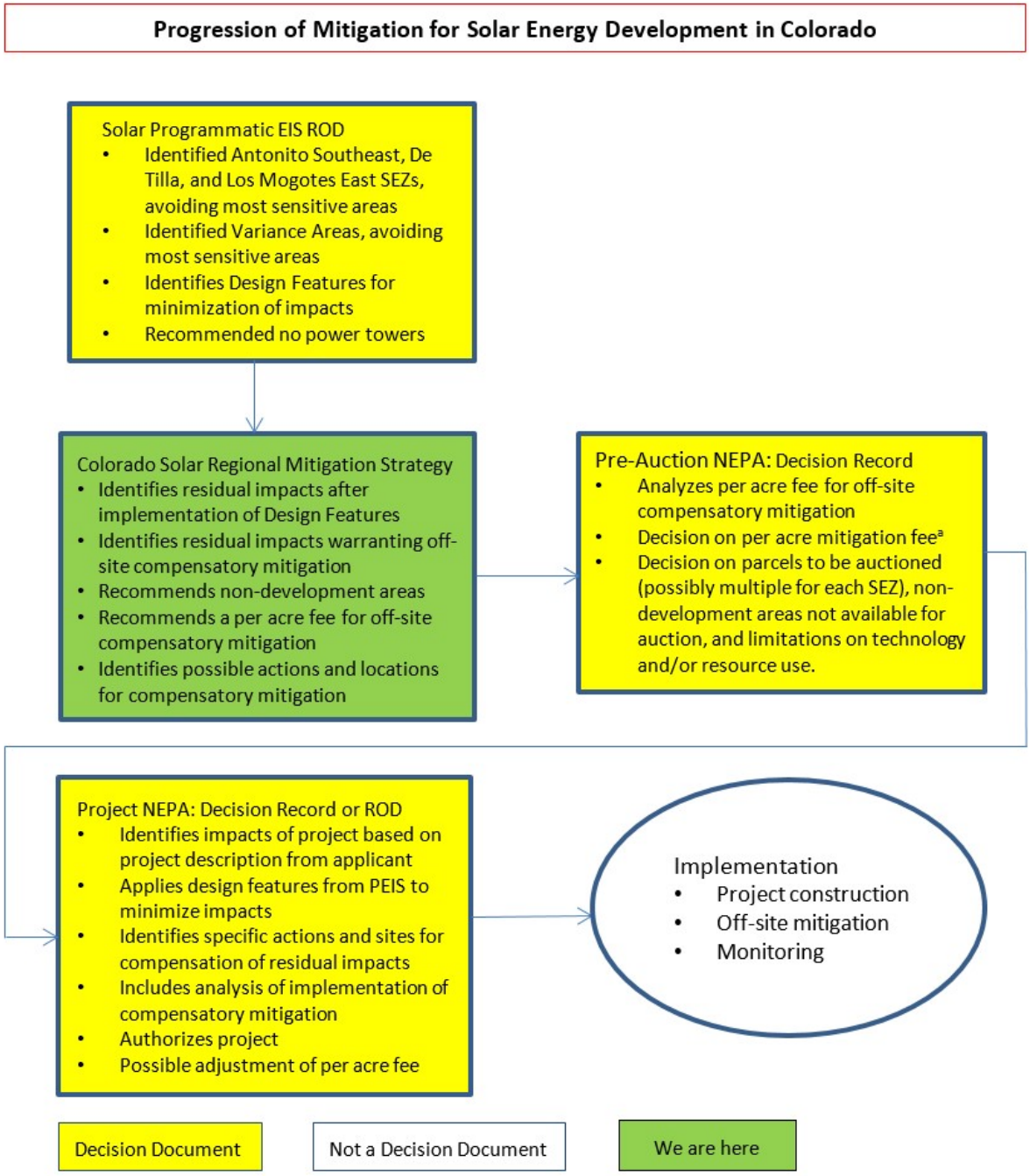
[6] For example, because the Solar PEIS ROD recommended that power tower technology projects not be allowed in the SEZs due to high potential for visual and water resource impacts, the BLM is restricting the applicability of the recommendations of this SRMS to photovoltaic and parabolic trough technologies only. Restricting the technologies addressed in this SRMS to lower-impact technologies minimizes impacts. Some new minimization measures (in addition to the Solar PEIS design features) have been recommended in this SRMS (Section 2.4.2.1).

[7] Conditions and trends of resources in the San Luis Valley/Taos Plateau region have been evaluated in a concurrent Landscape Assessment study, described at http://www.blm.gov/co/st/en/fo/slvfo/solar/landscape_assessment.html.



***The per acre mitigation fee identified in the pre-auction decision will be based on identified impacts warranting mitigation at that time, and could be modified if a subsequent project authorization decision identifies additional impacts warranting mitigation.**

Figure 1-1. Mitigation Flow Diagram for Solar Energy Development

Table 1-1. Costs Associated with Renewable Energy Development
(green highlighted element addressed in this Solar Regional Mitigation Strategy)

Cost Borne By Developer	When Paid	Disposition
Accepted Bid at Auction	At Issuance of Lease	U.S. Treasury (BLM recovers reasonable costs)
Rent (per acre) Nameplate Capacity Fee (per megawatt)	Rental Fee- At Issuance of Lease Namplate Capacity Fee – At the start of electricity generation	U.S. Treasury
Per acre Mitigation Fee (Recommended in this SRMS) Cost of contributed funds and other compensatory mitigation actions	At Issuance of Notice to Proceed	Held by BLM in a specific account or with third party, e.g., county
Cost of implementation of design features and other project-specific mitigation	During project construction and operation	Spent by developer on project implementation activities
Bond for post-closure reclamation of project site	At Issuance of Lease	Held by BLM, returned if not needed by BLM
Reclamation of project site after decommissioning	Cost borne by lease-holder, or BLM uses reclamation bond	Spent by developer (or BLM) on reclamation activities

1.3 Fourmile East Solar Energy Zone

The Fourmile East SEZ, with an area of 2,882 acres (11.7 km^2) and located in the southeast portion of the San Luis Valley, was designated as a SEZ in the Solar PEIS ROD (BLM 2012a). The Solar PEIS analysis for this SEZ identified the potential for significant impacts to cultural and Native American resources from solar development. Subsequently, BLM Colorado undertook additional tribal consultation to increase BLM's understanding of Native American concerns at the Fourmile East SEZ. BLM documented additional concerns brought forth by the San Luis Valley–affiliated Tribes who identified additional and specific cultural/historical information. All sixteen affiliated San Luis Valley Tribes were invited to participate in an ethnographic study and several were visited by BLM line officers, BLM & U.S Forest Service archaeologists, and contractors. Those Tribes that participated included the Jicarilla Apache, Diné (Navajo), and Southern Ute Tribes as well as the Pueblo of Picuris, each of which have historic, traditional and existing ties to the study area.

New ecological, landscape, and cultural information, in addition to affiliated tribe's concerns, include: cumulative and residual impacts to important big game habitat, the Caminos Antiguos Scenic Highway, the Old Spanish National Historic Trail, Great Sand Dunes National Park viewsheds, migratory birds, and golden eagles. Based on Tribal consultation (Oct 2012-May 2015), "Cultural Continuity: An Ethnographic Study Related to Potential Solar Development in the San Luis Valley, Colorado" (BLM; Higgins et al., 2013); results of pilot BLM San Luis Valley - Taos Plateau Landscape-Level Cultural Heritage Values and Risk Assessment (Feb 2014-August 2015; Wescott et al. 2016); and considering multiple resource functions, conditions, and landscape trends identified in the SLV-TP Landscape Assessment (Walston et al. 2016), BLM now plans to re-evaluate the designation of the Fourmile SEZ by completing a new NEPA and land use planning process to consider amending the San Luis Valley Resource Management Plan (RMP).

1.4 Solar Regional Compensatory Mitigation Strategy Development Process

During the period August 2012 through January 2014, the BLM piloted a regional mitigation strategy for solar energy development with the Dry Lake SEZ in Nevada, which constituted the first SRMS developed for an SEZ (BLM 2014b). BLM developed the Dry Lake SEZ SRMS simultaneously with, and serving as a pilot test case for, the establishment of BLM's policy on regional mitigation (Manual Section 1794; BLM 2016). The Dry Lake SEZ SRMS was completed in 2014 (BLM 2014b) and, together with the Departmental mitigation policy (DOI 2015), served as a guide for preparing this SRMS for the Colorado SEZs.

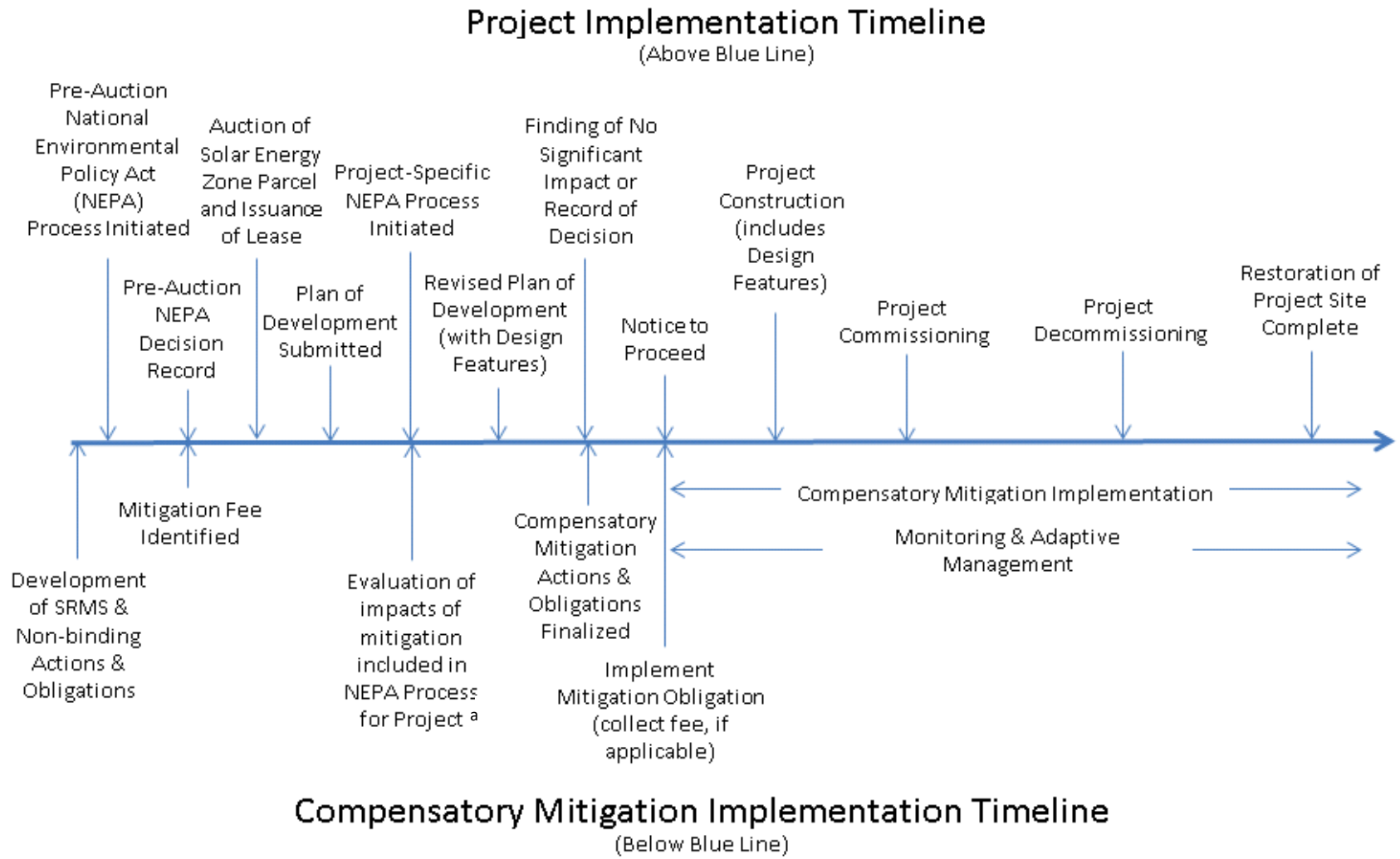
The BLM developed this Strategy for Colorado SEZs largely following the outline for regional mitigation planning presented in the Final Solar PEIS and Solar PEIS ROD, and the Dry Lake SEZ regional mitigation strategy pilot (BLM Technical Note 444, March 2014). An interdisciplinary team (IDT) of specialists from the BLM San Luis Valley Field Office in Colorado and the Taos Field Office in New Mexico, with the support of Argonne National Laboratory, produced a preliminary product at each step in the process, which was then presented and discussed in a public forum. The opportunity for written comments was also extended to the public. The methods used and content of this SRMS incorporate many of the ideas and comments received from the public.

The mitigation actions recommended in this strategy are designed to compensate for residual impacts to habitat, cultural resources, visual resources and ecological services that are expected from

the development of the Antonito Southeast, De Tilla Gulch, and Los Mogotes East SEZs (see Appendices A and C for impact summary and degree of impact warranting mitigation). The SRMS also addresses socioeconomic impacts and environmental justice issues for neighboring low-income and minority populations. For the purpose of this analysis, the BLM assumes that all of the developable land within the three SEZs will be impacted by solar development. BLM recommendations on the degree of compensation consider the condition of the resource values present in the SEZs and also consider the relative costs and benefits of the use of public lands for solar energy development, including the time and effort required to restore the disturbed areas upon expiration of the leases. The recommended compensatory mitigation actions are drawn from BLM IDT assessment, stakeholder recommendations, the San Luis Valley and Taos RMPs (BLM 1991 and BLM 2012b), and the San Luis Valley – Taos Plateau Level IV Ecoregion Landscape Assessment (BLM 2015). These documents describe resource management goals and objectives and identify restoration and preservation needs within the landscape in which the SEZs are located.

Under this Strategy, BLM's recommended mitigation fees for the Colorado SEZs are primarily based on the impacts of solar development in the SEZs, with modifiers incorporated to account for various factors including the existing condition of the SEZs. As part of the BLM solar energy program, long-term monitoring will be used to evaluate the effectiveness of the regional compensatory mitigation strategy for the Colorado SEZs (consistent with the BLM Assessment, Inventory, and Monitoring [AIM] Strategy [Toevs et al. 2011]). This regional compensatory mitigation strategy will be subject to continued review and adjustment to ensure that mitigation desired outcomes are being met.

The timeline of this SRMS process, relative to a solar development project implementation schedule, is provided in Figure 1-2. The compensatory mitigation obligation (fee) will be evaluated, along with the environmental impacts of leasing a particular parcel of land within the SEZ for future solar energy development, through a pre-auction NEPA analysis and established through an accompanying decision. The compensatory mitigation obligation, site(s), and action(s) strategically recommended in this Strategy will be considered in the project-specific NEPA evaluation (e.g., Environmental Assessment) required for planned solar energy development within the Colorado SEZs (see Figure 1-1). At the conclusion of the project-specific NEPA evaluations, the BLM authorized officer will identify the appropriate compensatory mitigation objective(s), obligation or fee, site(s), and action(s) as part of the BLM's project decision. The compensatory mitigation objective(s), obligation or fee, site(s), and action(s) selected by the authorized officer may differ from the recommendations made in this SRMS document based on several factors, including but not limited to (1) new information regarding the presence/absence of environmental resources that may change the potential for impact, (2) implementation of additional design features, avoidance areas, or other technologies not evaluated in the BLM Solar PEIS that would minimize impacts, (3) new information about additional mitigation sites or actions; and/or (4) updated assessments of costs associated with impacts and an adjustment of the base fee for inflation to current year dollars.



[a] In some cases NEPA for mitigation actions could be completed after the project specific NEPA and closer in time to when the mitigation action is implemented.

Figure 1-2. Timeline of Solar Regional Compensatory Mitigation Processes Relative to Solar Energy Development Schedule

1.5 Stakeholder Engagement & Involvement in the Solar Regional Compensatory Mitigation Strategy

BLM stakeholder engagement and input in developing the SRMS for the Colorado SEZs included briefings to the Front Range Resource Advisory Council and County Commissioner, multiple news releases, radio interviews, field visits, two workshops in the San Luis Valley, Colorado several web-based meetings, grazing permittee meetings, and phone conversations during the period 2014-2015. Representatives from federal and state agencies, and local government; nongovernmental organizations concerned with issues such as environmental or recreational impacts; representatives from the solar development industry and utilities; tribal representatives; and individual members of the public were invited to attend these activities. Approximately twenty-five individuals and representatives from organizations attended the kickoff workshop held September 10, 2014. During this workshop, background on solar regional compensatory mitigation strategies and the Solar PEIS impact assessment for the Colorado SEZs was provided to the attendees. In addition, there were field visits/open houses for each of the three Colorado SEZs on September 8th, 9th, and 11th.

The second workshop was held May 13-14, 2015. This workshop included a review of progress on assessment of impacts and/or regional trends for air quality, visual, and cultural resources; a discussion of regional goals and objectives and mitigation desired outcomes for the Antonito Southeast, De Tilla Gulch, and Los Mogotes East SEZs; and presented candidate mitigation sites proposed by the BLM and by stakeholders for consideration. The second workshop had about 25 attendees, including individuals and representatives from agencies, nongovernmental organizations, the solar industry and consultants to the industry, utilities, and tribes.

Additionally, the following webinars were held:

- on December 17, 2014, to provide information on revisions to impact tables and impacts that may warrant regional compensatory mitigation;

- on February 5, 2015, to discuss comments received on impacts warranting mitigation, to revisit mitigation goals and objectives and candidate mitigation sites, and to update landscape assessment data; and

- on July 7, 2015, to provide an update on regional goals and objectives, review candidate site matrix revisions and additional spatial site narrowing criteria, and present a draft approach to identifying the mitigation obligation

All presentations from the workshops and webinars were posted on the project documents web page on the Colorado SEZs SRMS Project website at: http://www.blm.gov/co/st/en/fo/slvfo/solar/solar_regional_mitigation.html

Additional baseline information and materials, including BLM CO SEZ hydrological studies and sensitive species surveys were provided for stakeholder review and are posted on the project website documents page.

Throughout the project, stakeholders were invited to comment on interim draft materials, including the summary of residual impacts, assessment of residual impacts that may warrant regional compensatory mitigation for the three Colorado SEZs, the regional goals and objectives and the mitigation desired outcomes, the matrix used to evaluate candidate compensatory mitigation sites and activities proposed for the Colorado SEZs, and the preliminary recommended mitigation fee.

Stakeholders were also asked to submit recommendations for mitigation sites. Many stakeholder comments were discussed during the workshops and webinars and were used to guide development of this strategy.

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2 MITIGATION STRATEGY –COLORADO SOLAR ENERGY ZONES

2.1 Description of the Colorado Solar Energy Zones and Surrounding Region

2.1.1 General Description of the Antonito Southeast Solar Energy Zone

The Antonito Southeast SEZ is located in southeastern Conejos County (2010 Census population of 8,256) at the southern extent of the San Luis Valley, on the Colorado state boundary with New Mexico, and adjacent to the Rio Grande del Norte National Monument. The total area of the Antonito Southeast SEZ, as shown in Figure 2-1, is 9,729 acres (39.4 km^2), including 17 acres (0.07 km^2) of wetland and lake areas identified in the Solar PEIS ROD as non-development areas. The total developable area of the SEZ as identified in the final Solar PEIS and ROD is 9,712 acres (39.3 km^2). The nearest major road accessing the Antonito Southeast SEZ is U.S. 285 which runs along the western boundary of the SEZ. The area around the SEZ is sparsely populated.

Conejos County has a high percentage of low income population relative to that of the rest of Colorado (percent in poverty is 23% relative to Colorado overall of 13% in poverty; U.S. Census 2015). It also has a large Hispano population of 56% (relative to 21% Hispano population in Colorado as a whole). The closest community to the Antonito Southeast SEZ is Antonito, Colorado (Population 781 in 2010), about 2 mi (3 km) to the northwest. Antonito and several smaller, historic agricultural community neighborhoods in Conejos County, include low income populations (50% low income in Antonito vs 30% in Colorado as a whole) and minority populations (75% minority in Antonito vs 30% in Colorado as a whole) (EPA EJScreen Tool 2015).

Culturally, the Antonito Southeast SEZ and surrounding area is rich and notably encompassed by tribal, Hispano, and other cultural land use heritage that precedes U.S. public lands tenure and BLM solar energy planning by thousands of years. Multi-generational rural agriculture including SEZ area livestock grazing, sustenance hunting and recreational life ways tracing to the Mexican and Territorial era Conejos Land Grant, Homestead Act, and early Statehood period (1830-1910) distinguish the Antonito Southeast SEZ and surrounding area. The SEZ occurs within the congressionally-designated *Sangre de Cristo National Heritage Area (March 2009)*.

2.1.2 General Description of the De Tilla Gulch Solar Energy Zone

The De Tilla Gulch SEZ is located in Saguache County in south-central Colorado at the northern end of the San Luis Valley. The developable area of the De Tilla Gulch SEZ, as shown in Figure 2-2, is 1,064 acres (4.3 km^2). When the SEZ was first proposed in the Draft Solar PEIS, the southern boundary was set at approximately one quarter mile from the Old Spanish National Historic Trail, which runs from east to west near the southern SEZ boundary. Although indirect impacts to the Trail from solar development in the SEZ would be likely, direct impacts were avoided through siting 0.25 miles from the trail. In the Final Solar PEIS and ROD, the size of the SEZ was reduced by 458 acres (1.9 km^2) to reduce impacts on an active Gunnison prairie dog colony, on pronghorn winter range and winter concentration area, and on the proposed Cochetopa Scenic Byway.

The town of Saguache is located about 6 mi (10 km) southwest of the SEZ. The towns of Moffat and Crestone are visible from the SEZ and are located about 9 (14 km^2) and 17 miles (27 km^2) from it

respectively. Alamosa is located about 50 mi (80 km) south of the SEZ. The nearest major road access is U.S. 285, a two-lane highway, which passes along the northwestern border of the SEZ.

Saguache County has a high percentage of low income population relative to that of the rest of Colorado (percent in poverty is 29% relative to Colorado overall of 13% in poverty; U.S. Census 2015). It also has a large Hispano population of 40% (relative to 21% in Colorado as a whole).

2.1.3 General Description of the Fourmile East Solar Energy Zone

The Fourmile East SEZ is located in Alamosa County in south-central Colorado, in the southeast portion of the San Luis Valley. The developable area of the Fourmile East SEZ, as shown in Figure 2-3, was estimated as 2,882 acres (11.7 km^2) in the Final Solar PEIS and ROD. About 3,882 acres (15.7 km^2) were originally identified for analysis in the Draft Solar PEIS, but through the Solar PEIS ROD the BLM eliminated 999 acres (4 km^2) and identified a total of about 1 acre (0.004km^2) of dispersed wetlands as non-development areas. The eliminated areas were primarily on the west side of the SEZ to avoid or minimize impacts on known cultural resources, a historic playa basin, Caminos Antiguos Scenic Byway, the Old Spanish National Historic Trail, the Pike National Historic Trail, big game winter range, and important riparian habitat. The nearest major road access to the SEZ is via U.S. 160 which runs from west to east about 0.6 mi (1 km) south of the SEZ, while CO 150 runs north–south near the eastern border of the SEZ.

The town of Alamosa is located about 13 mi (21 km) west of the SEZ and had an estimated 2013 population of 9,562. In 2014, the county population was 16,177. Great Sands Dunes National Park is located about 9 mi (14 km) north of the SEZ on CO 150. The San Luis and Rio Grande Railroad serves the area, as well as the Rio Grande Scenic Railroad.

As stated in Section 1.3, the BLM has concluded that this area is no longer suitable for utility scale solar development due to the potential for significant impacts to cultural and Native American resources from solar development.

2.1.4 General Description of the Los Mogotes East Solar Energy Zone

The Los Mogotes East SEZ is located in Conejos County in south-central Colorado in the southern San Luis Valley. The developable area of the Los Mogotes East SEZ, as shown in Figure 2-4, is 2,650 acres (10.7 km^2). About 5,918 acres (24 km^2) were originally identified for analysis in the Draft Solar PEIS, but the BLM eliminated 3,268 acres (13.2 km^2) on the western side of the SEZ to avoid or minimize impacts on significant cultural resources; grazing allotments; an important riparian area; Gunnison prairie dog, burrowing owl, ferruginous hawk, mountain plover, pronghorn birthing and winter habitat; and visual resources. The nearest major road access to the SEZ is via U.S. 285, southbound from the City of Alamosa which runs north-south about 3 mi (5 km) to the east of the SEZ.

Several small towns and communities including Romeo, La Jara, Manassa, Sanford, and Capulin (with populations of 404, 818, 980, 870, and 200, respectively [U. S. Census 2015]) are located near to the SEZ at distances ranging from between 3-6 miles mi (5 km) directly to the east, northeast, and north of the SEZ on U.S. 285. The Conejos County seat at Conejos and the town of Antonito are 4.4 and 5.2 miles from the SEZ respectively but not visible from it. As is the case for the Antonito Southeast SEZ,

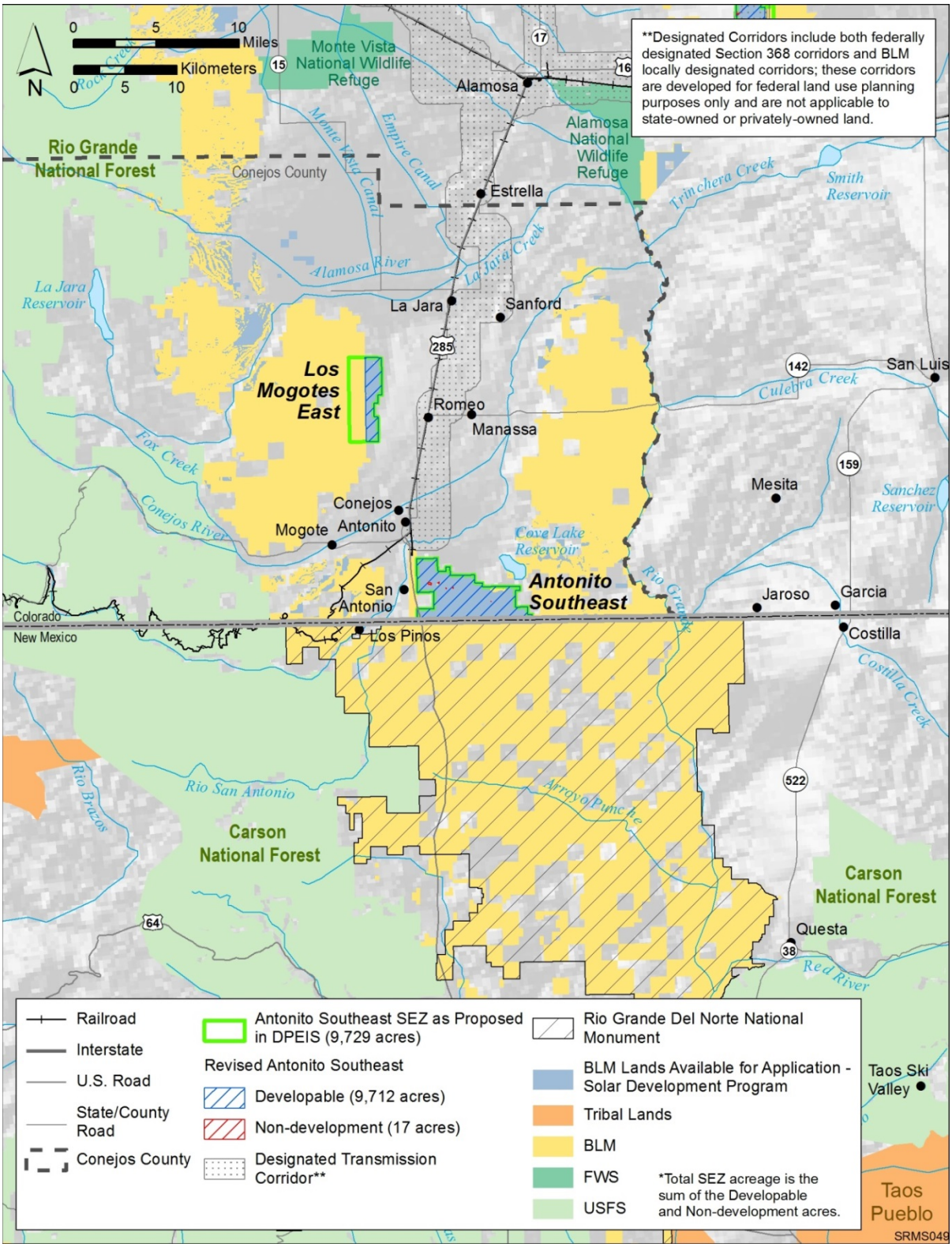

Figure 2-1. Antonito Southeast Solar Energy Zone and Surrounding Areas as Identified in the Solar PEIS (Source: BLM and DOE 2012)

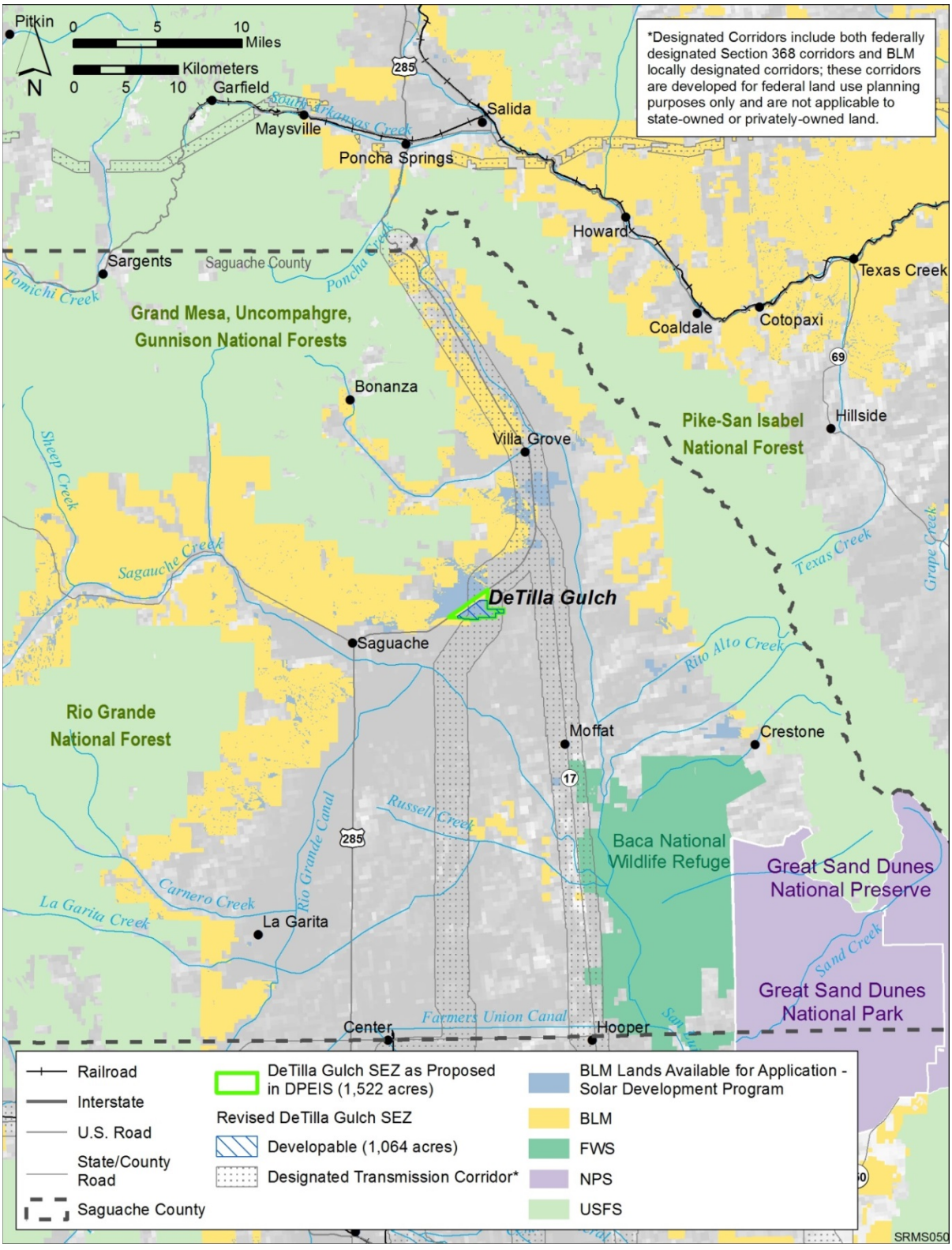

Figure 2-2. De Tilla Gulch Solar Energy Zone and Surrounding Areas as Identified in the Solar PEIS (Source: BLM and DOE 2012)

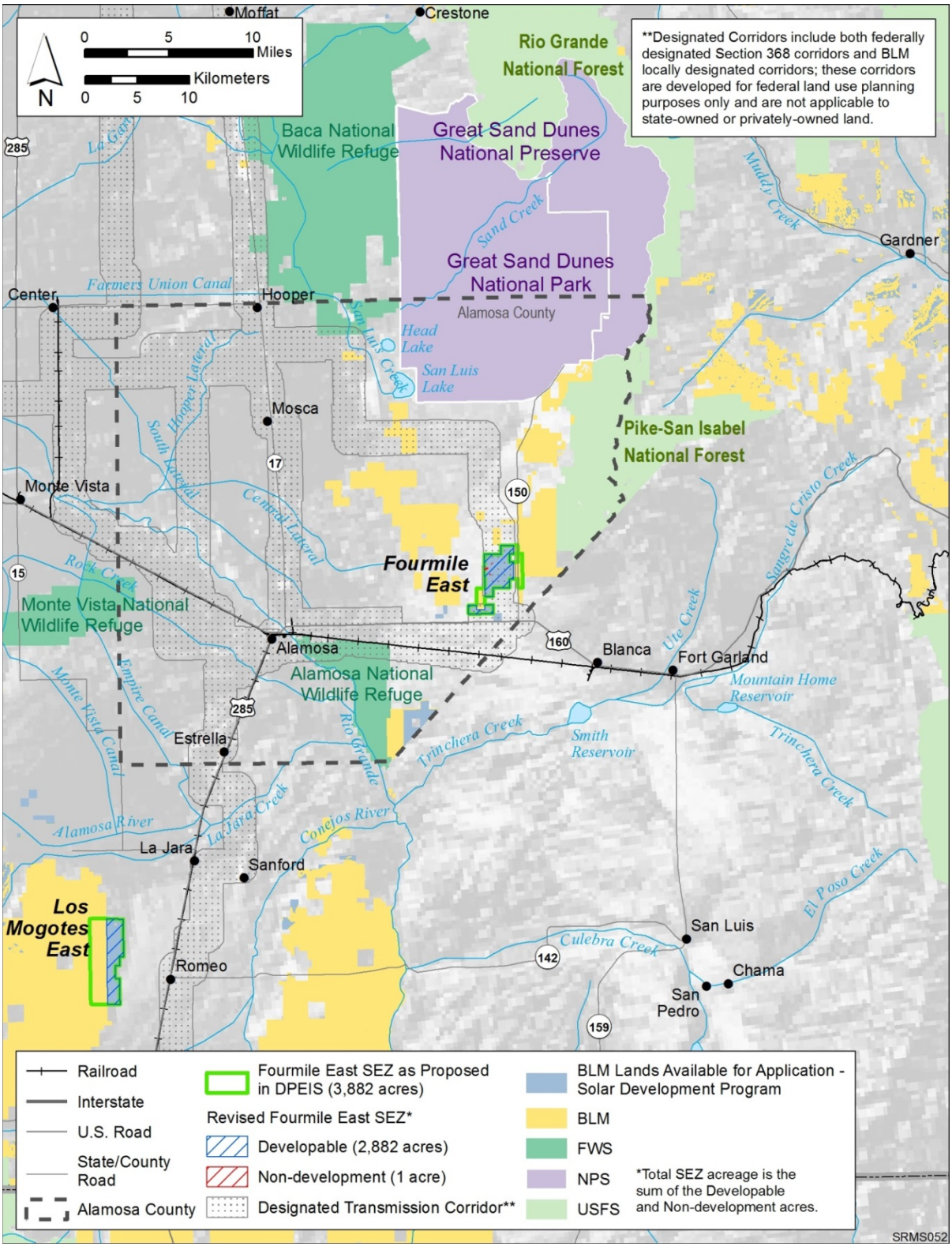

Figure 2-3. Fourmile East Solar Energy Zone and Surrounding Areas as Identified in the Solar PEIS (Source: BLM and DOE 2012)

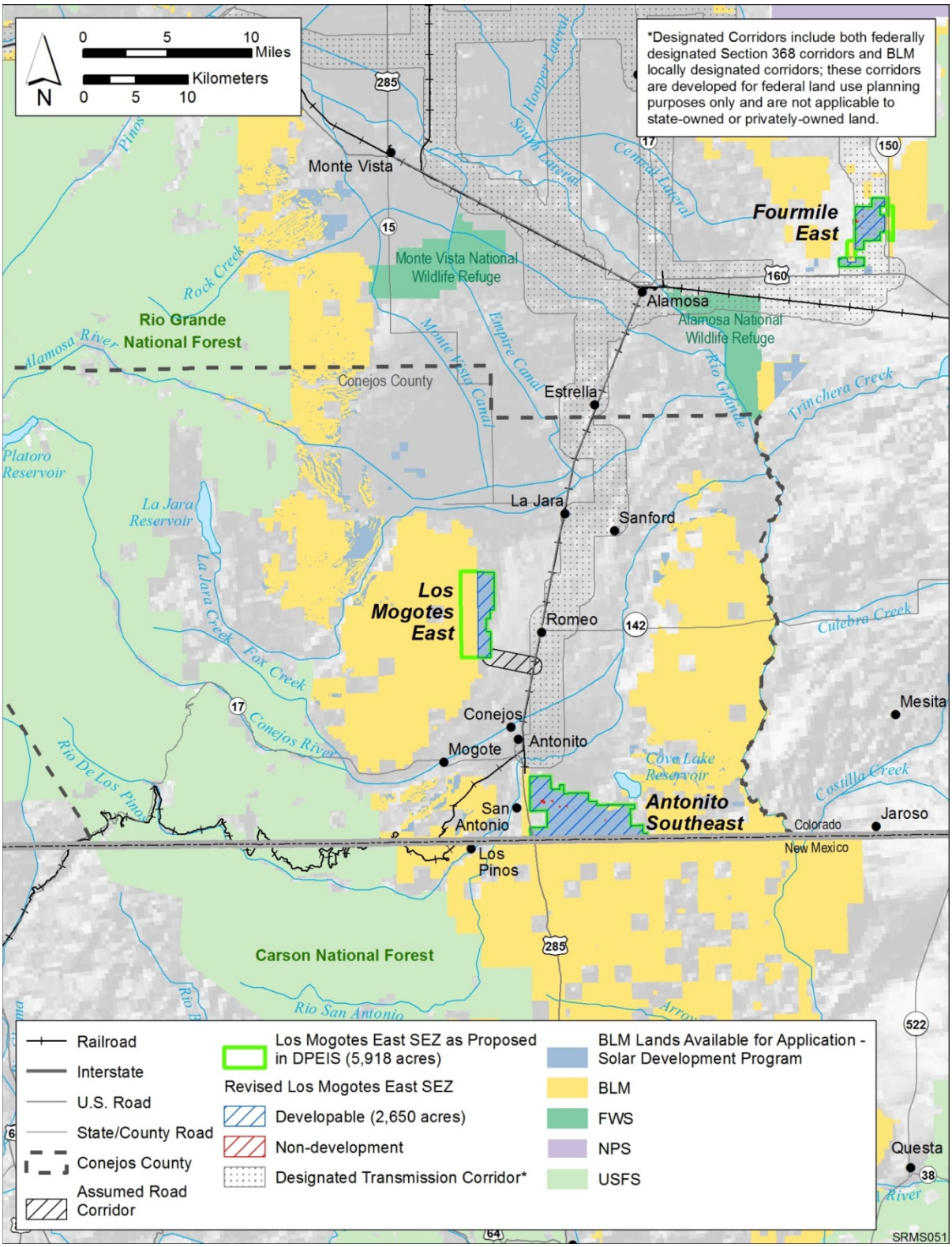

Figure 2-4. Los Mogotes East Solar Energy Zone and Surrounding Areas as Identified in the Solar PEIS (Source: BLM and DOE 2012)

agricultural community neighborhoods in Conejos County near the Los Mogotes East SEZ include low-income (51% vs 30% CO average) and minority (51% vs 30% CO average) populations adjacent to the SEZ (EPA EJScreen Tool 2015).

Culturally, the Los Mogotes E SEZ area is rich and notably encompassed by tribal, Hispano, and other cultural land use heritage that precedes U.S. public lands tenure and BLM solar energy planning by thousands of years. Multi-generational rural agriculture including livestock grazing, sustenance hunting and recreational life ways tracing to the Mexican and Territorial era Conejos Land Grant, Homestead Act, and early Statehood period (1830-1910) distinguish the Los Mogotes East SEZ and surrounding area. The SEZ occurs within the congressionally designated *Sangre de Cristo National Heritage Area (March 2009)*.

2.1.5 Landscape Intactness of the Colorado Solar Energy Zones and the Region

In 2016, the BLM San Luis Valley – Taos Plateau Level IV Ecoregion Landscape Assessment (Walston et al. 2016) was completed. The study area of the landscape assessment (LA) encompasses the Colorado SEZs; the study was conducted to document the current status of San Luis Valley-Taos Plateau conservation elements (CEs) at the ecoregional scale and evaluate the trends and vulnerability of these resources to change agents over time. The LA was based on approaches similar but not identical to BLM Rapid Ecoregional Assessment (REA) approaches completed for the Colorado Plateau and Mojave Basin and Range Ecoregions (BLM 2012c; BLM 2013). Similar to the REAs, the LA serves multiple purposes in an ecoregional context, including identifying and answering important management questions; understanding key resource values; understanding the influence of various change agents; understanding projected ecological trends; identifying and mapping key opportunities for resource conservation, restoration, and development; and providing a baseline to evaluate and guide future actions.

One useful product of the LA is the development of the Landscape Intactness Model. This geospatial model was created to represent the level of intactness or naturalness throughout the ecoregion at the time in which the LA was prepared (2015). A near-term future landscape intactness model was also developed to characterize the anticipated future intactness of the landscape (modeled for approximately the year 2025). Because ecological intactness is generally considered to be a function of the intensity of and proximity to human developments (Theobald 2013), this landscape intactness model is a combination of two primary factors—human land use and a distance-decay function from land uses. Different land use categories were assigned a relative value between 0 and 1, representing very high landscape alteration to very little landscape alteration. For example, high-density urban areas received values closer to 0, whereas intact undisturbed areas received values closer to 1. The distance decay function considered the proximity of each site to human land uses. Table 2-1 lists a number of examples of land use and distance decay scores for various stressor categories in the ecoregion. A full description of the landscape intactness model and how it was developed can be found in the LA report (Walston et al. 2016).

The current and near-term future landscape intactness models were summarized to 1 km^2 reporting units and categorized to represent intactness in one of six classes (from very low to very high intactness) (Figure 2-5). The resulting map provides a composite view of the relative impacts of current and future land uses across the entire ecoregion. Darker green areas indicate apparently least impacted

Table 2-1. Landscape Intactness Model Impacting Factors, Site Impact Scores, and Distance Decay Scores for the San Luis Valley – Taos Plateau Landscape Assessment.[1] (Source: Walston et al. 2016)

Human Land Use or Impact Factor	Site Impact Score[2]	Presumed Relative Stress[3]	Distance of Influence (m)[4]	Function[5]
Transportation				
Dirt roads, OHV trails	0.75	Low	500	Linear
Local roads	0.3	Medium	1000	Logistic
Primary highways	0.015	High	4000	Logistic
Urban and Industrial Development				
Low density development (including rural development)	0.6	Medium	1000	Logistic
Medium density development	0.35	Medium	2000	Logistic
High density development	0.015	High	4000	Logistic
Communication Towers	0.6	Low	200	Linear
Powerlines / transmission lines	0.6	Low	200	Linear
Mines and oil/gas well pad locations	0.2	High	1000	Logistic
Urban Polygons (BLM and U.S. Census Bureau)	0.015	High	4000	Logistic
High Impervious Surfaces (NLCD Imperv > 40)	0.3	Medium	500	Logistic
Urban Lights (NASA Night Lights > 200)	0.05	High	4000	Logistic
Managed and Modified Land Cover				
Low agriculture (ruderal forest, recently burned, recently logged, etc.)	0.7	Low	500	Linear
Pasture (landcover)	0.7	Low	500	Linear
Grazing allotment polygons	0.7	Low	500	Linear
Introduced vegetation (i.e., invasive species)	0.6	Medium	500	Linear
Cultivated agriculture	0.35	Medium	2000	Linear

[1] Modeling approach and parameters are adopted from the Landscape Condition Model prepared for the Mojave Basin and Range Rapid Ecoregional Assessment (BLM 2013).

[2] Site Impact Score ranges between 0 and 1 and provides an indication of presumed ecological stress or impact. Lower values (closer to 0) indicate a greater site impact. Values adopted from previous modeling efforts by Brown and Vivas (2005), Woolmer et al. (2008), Comer and Hak (2012), and Theobald (2013).

[3] Presumed relative stress indicates the level of influence the impacting factor has relative to other impacting factors. For example, high-density developments such as urban areas have the highest relative stress scores.

[4] Distance of influence is the minimum distance at which intactness values approach 1.0. Values adopted from previous modeling efforts by Comer and Hak (2012), which described the methodology for completing the Landscape Condition Model for the BLM Mojave Basin and Range REA.

[5] Distance decay functions for impacting factors with low or medium relative levels of stress were evaluated with linear or logistic functions. Distance decay functions for impacting factors with high relative levels of stress were evaluated with logistic functions.

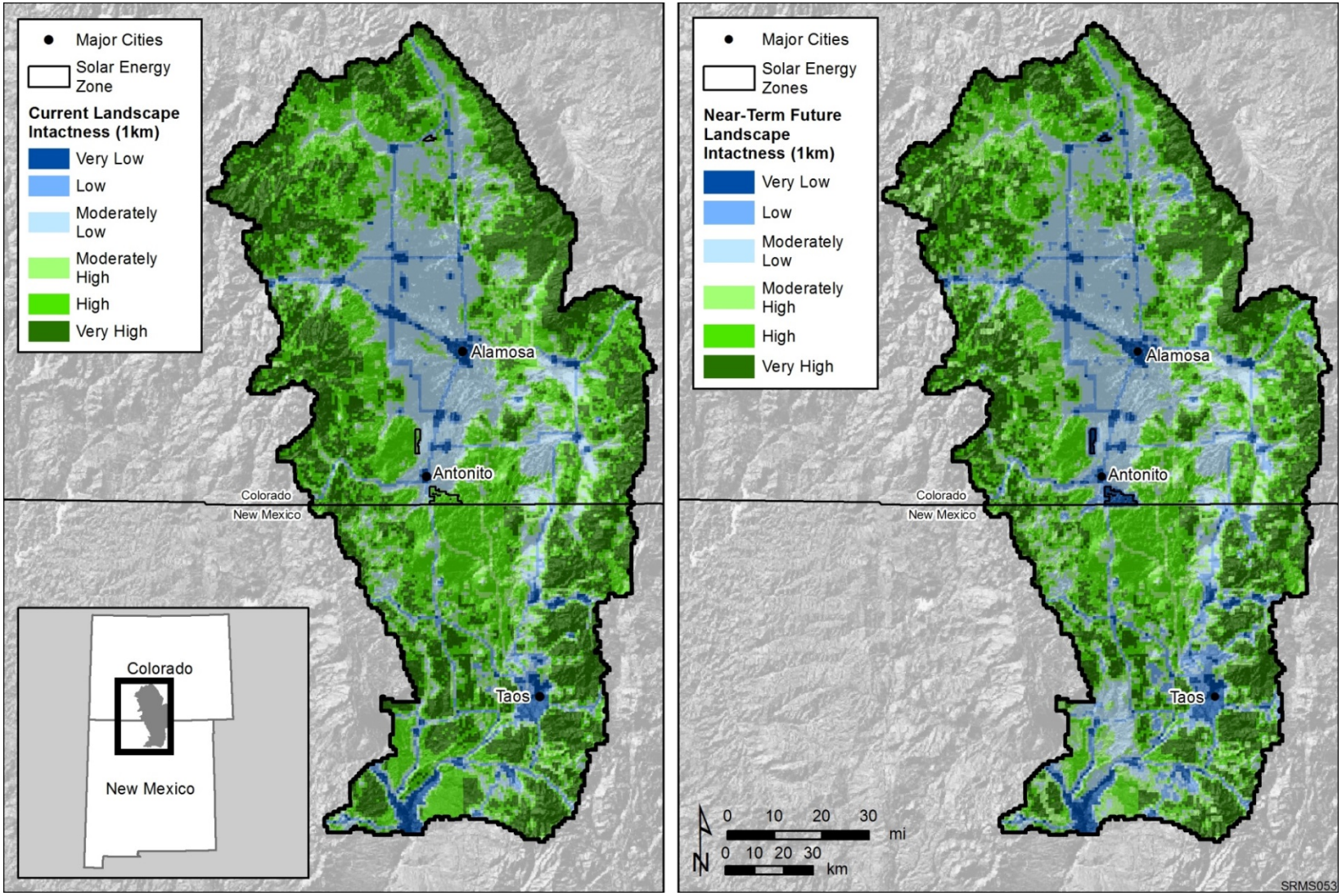

Figure 2-5. Current (2015) and Near-term Future (e.g., 2025-2030) Landscape Intactness Models for the San Luis Valley-Taos Plateau Level IV Landscape Assessment. Landscape intactness is summarized to 1 km^2 reporting units and categorized from very low intactness (dark blue) to very high intactness (dark green). (Source: Walston et al. 2016).

areas (most intact) and blue areas are the most impacted (least intact). According to this landscape intactness model, most of the impacts in the study area occur near urban areas and along roadways. It is important to note that the near-term future intactness model assumes full build-out solar energy development (that is, development on 80% of the SEZ area) on the three Colorado SEZs. Current and future landscape intactness for each of the Colorado SEZs is shown in Figures 2-6 and 2-7.

Results of the current and near-term future landscape intactness models depict the degree of human modification across the region and are used in this SRMS as general indicators of ecological integrity. However, these models do not incorporate other measures of ecological function and structure such as the presence of insect pests and diseases, climate change, and measures of biodiversity – all of which are important attributes of ecological integrity that are not directly measured through human disturbance proxies. For this reason, the ecological evaluations presented in this SRMS are not solely based on the landscape intactness model, but also incorporate several other regional models and assessments prepared to address climate change, invasive species, insects, and diseases, soils, hydrology, biodiversity, and fire.

Climate change models are important indicators of ecosystem change and may be useful in evaluating conditions and trends of select natural resources. The LA report also describes the process for characterizing current and potential future climate change in the San Luis Valley – Taos Plateau ecoregion. Climate change models developed for the LA were based on predicted future seasonal changes in precipitation and temperature obtained from the PRISM Climate Group (http://www.prism.oregonstate.edu/) and simulation results from the International Panel on Climate Change (IPPC) general circulation models. Current and future climate change model results for the ecoregion were summarized within 4 km grid cells and are displayed in Figure 2-8.

A summary of the Ecological Systems CEs in the ecoregion that were evaluated in the LA are presented in Figure 2-9. In total, there were four broad ecological systems evaluated in the LA, based on vegetation macrogroups: Basin Grassland & Shrubland, Montane & Subalpine Conifer Forest, Pinyon-Juniper Woodland, and Riparian & Wetland Systems.

The current and future intactness of Ecological Systems macrogroups in the ecoregion were evaluated in the LA (Walston et al. 2016) and used to inform the assessment of regional conditions and trends presented in Section 2.1.5.2. These assessments of condition and trend incorporated geospatial intersections with Change Agent models and LANDFIRE vegetation departure (VDEP; USGS 2008) to understand the potential for these systems to experience perturbation and evaluate how current vegetation communities have changed relative to historic conditions (see Figures 2-10 through 2-13). For example, based on evaluations presented in the LA, the basin grassland and shrubland macrogroup, which comprises the majority of the SEZs considered in this SRMS, is within areas of high current ecological intactness. Approximately 46% of these systems occur in areas of high current ecological intactness (Figure 2-10; Figure 2-13). Future trends in ecological intactness indicate a decrease in ecological intactness within basin grassland and shrubland systems notably along a western axis that extends in the study area from Poncho Pass in the north to the Taos Plateau in the south. The amount of these systems occurring within areas of high and very high ecological intactness is expected to decrease by approximately 12% in the near-term (i.e., by 2030) (Figure 2-13).

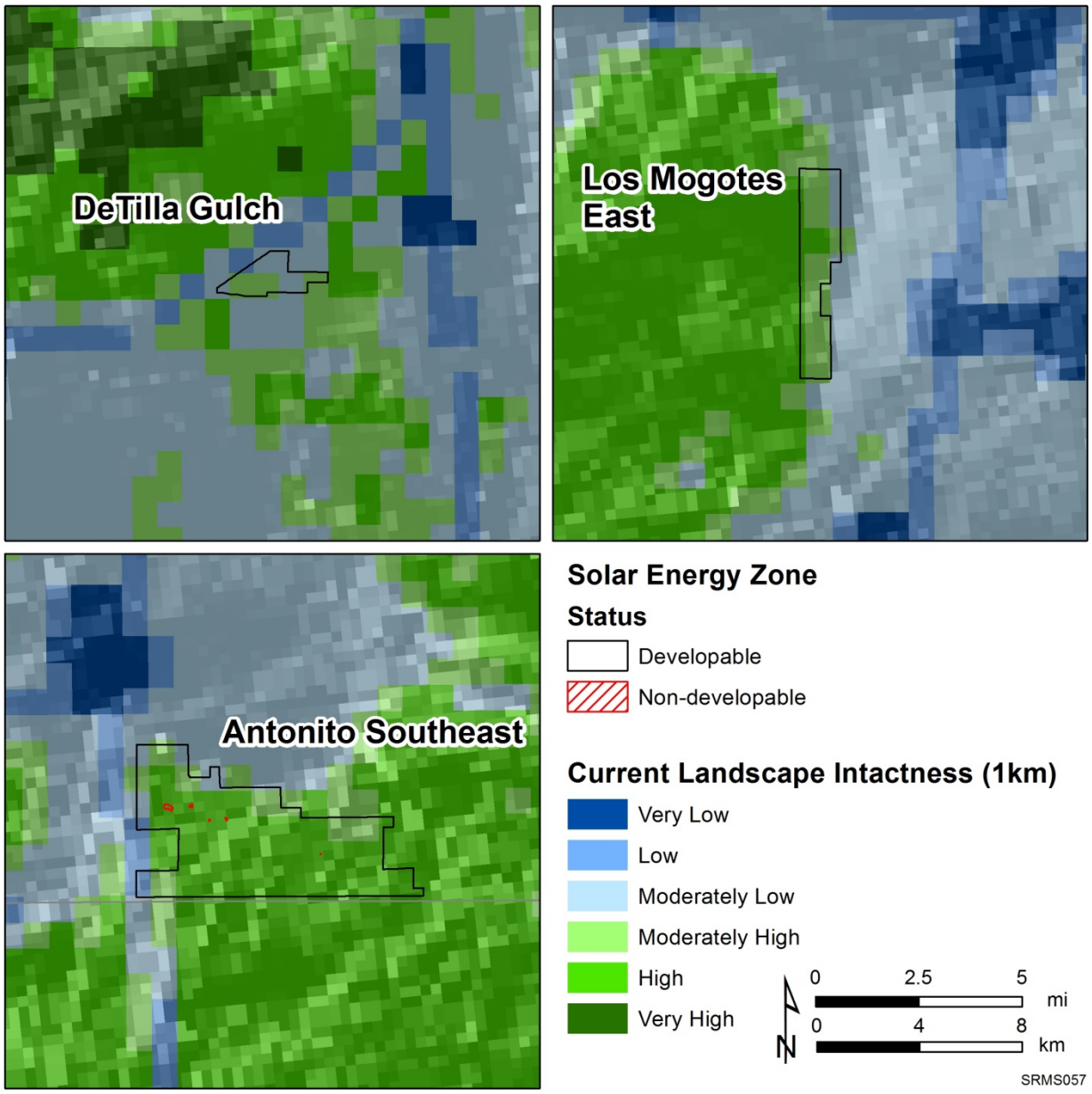

Figure 2-6. Current (2015) Landscape Intactness at Each of the Three Colorado Solar Energy Zones (Source: Walston et al. 2016)

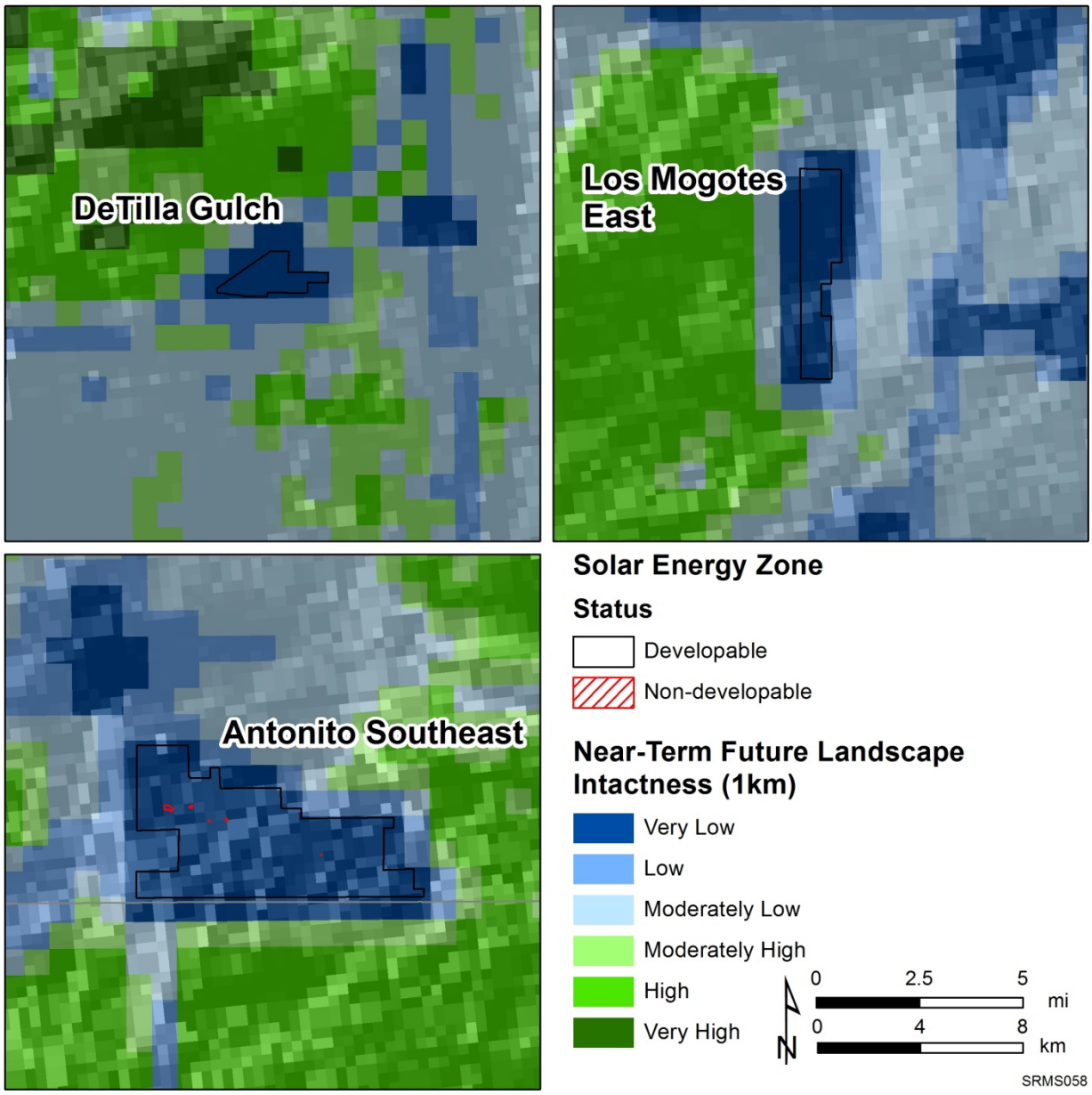

Figure 2-7. Near-term Future (e.g., 2025-2030) Landscape Intactness at Each of the Three Colorado Solar Energy Zones (Source: Walston et al. 2016)

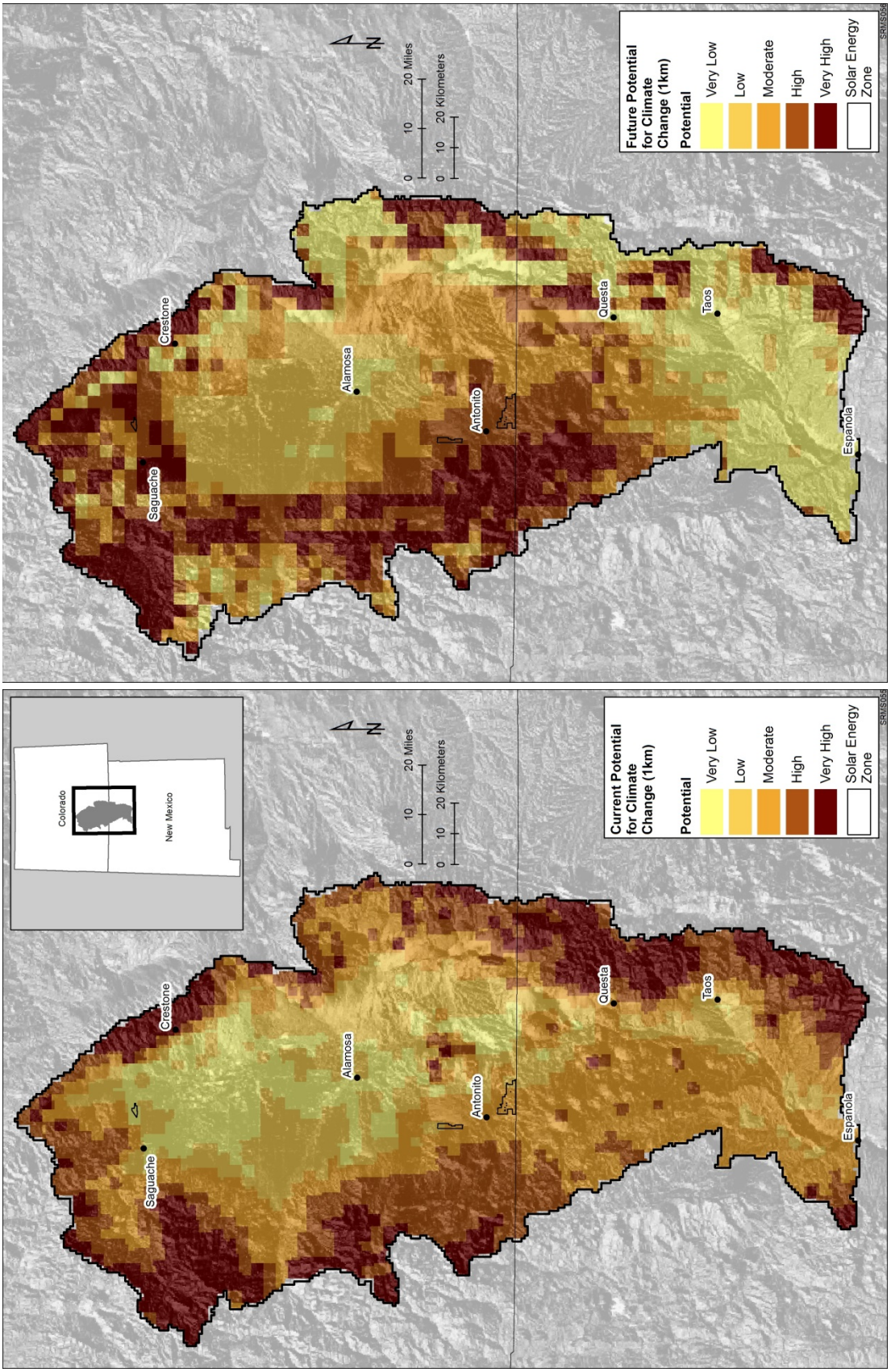

Figure 2-8. Current (2015) and Future (approximately the years 2040-2069) Climate Change Potential for the Ecoregion (Source: Walston et al. 2016)

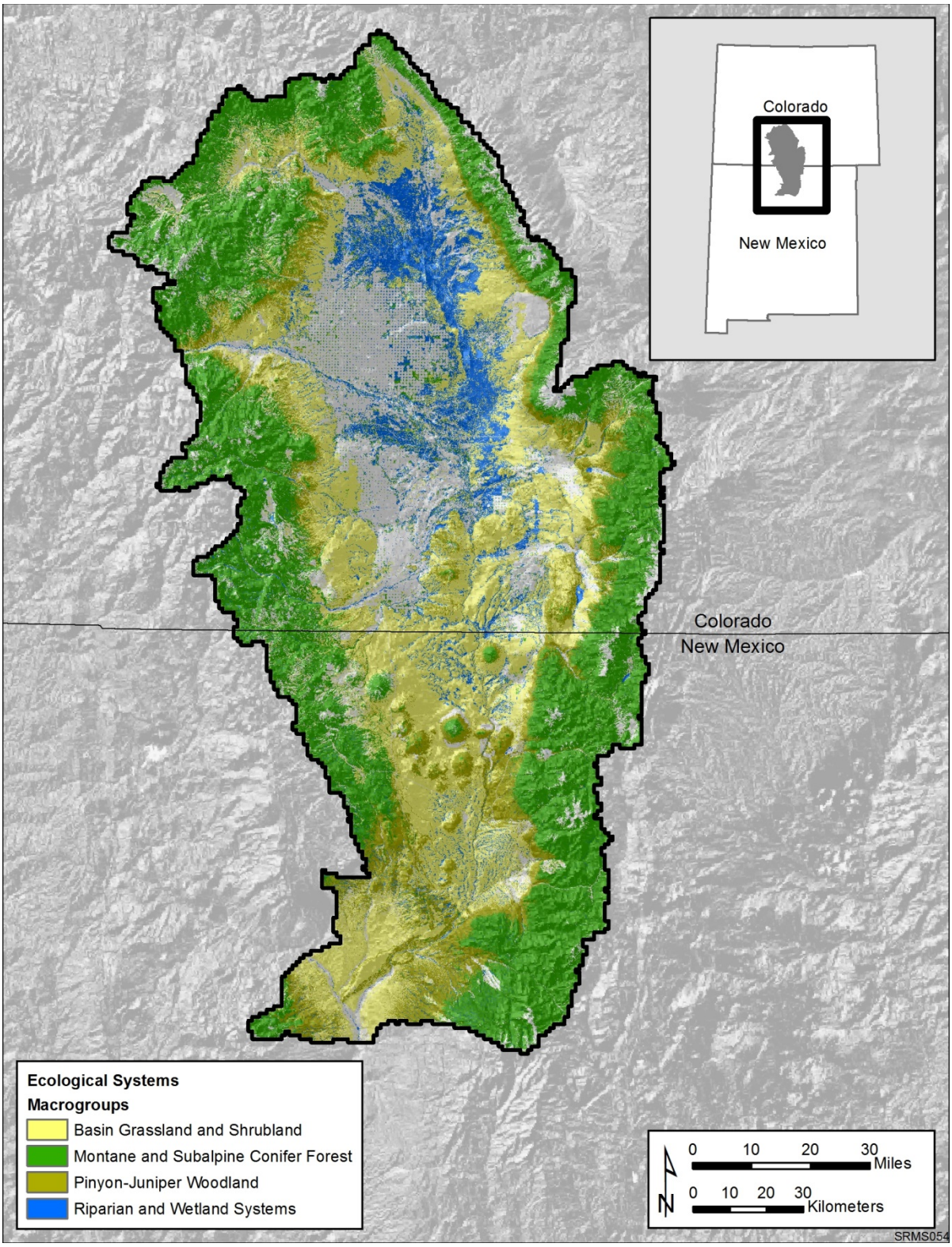

Figure 2-9. Distribution of Ecological Systems Conservation Elements in the San Luis Valley-Taos Plateau Landscape Assessment Study Area (Source: landfire.gov; Walston et al. 2016)

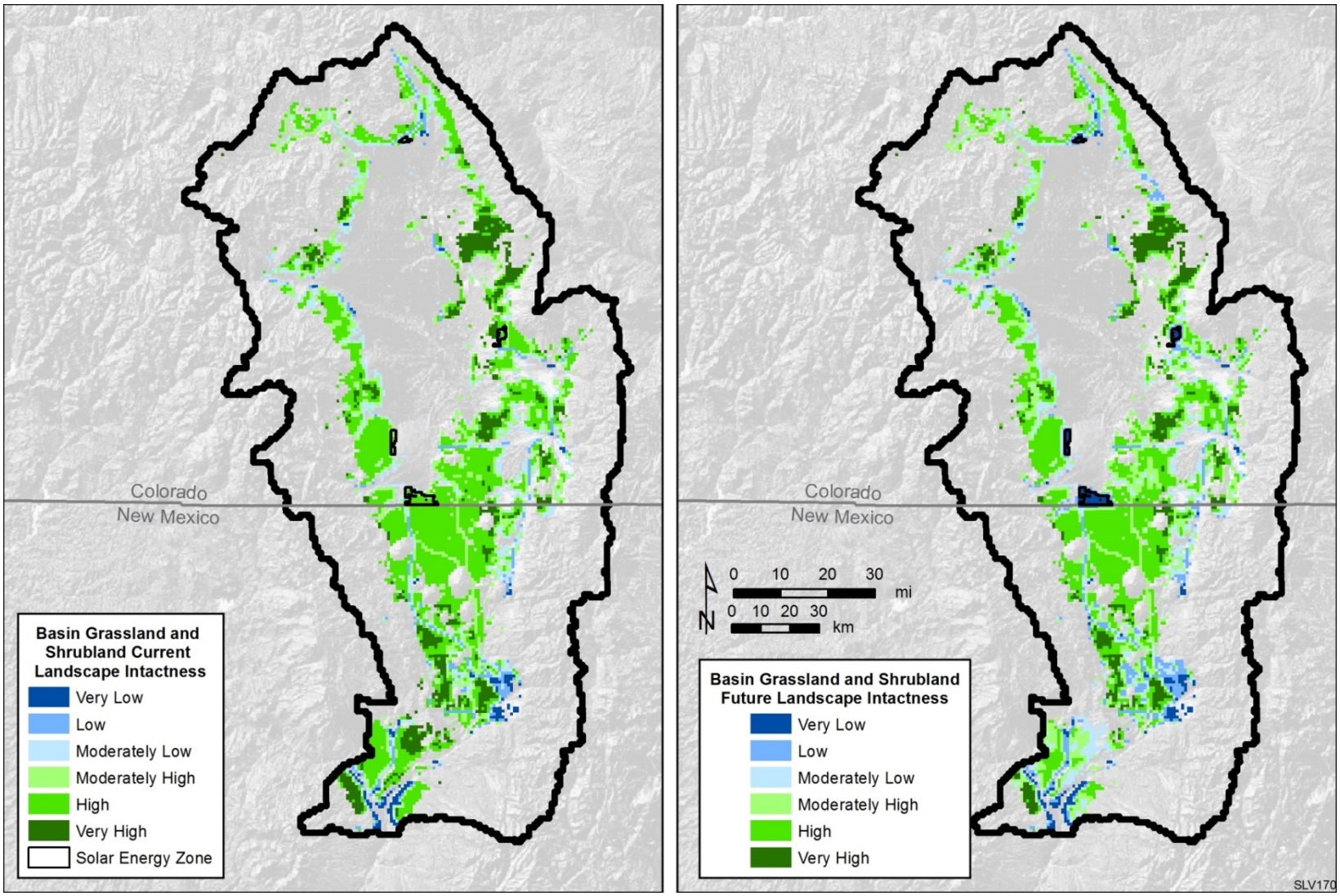

Figure 2-10. Current (2015) and Near-term Future (e.g., 2025-2030) Landscape Intactness of Basin Grasslands and Shrublands. NOTE: This landscape intactness model does not include LANDFIRE Vegetation Departure (VDEP). Data Source: LANDFIRE EVT (USGS 2010).

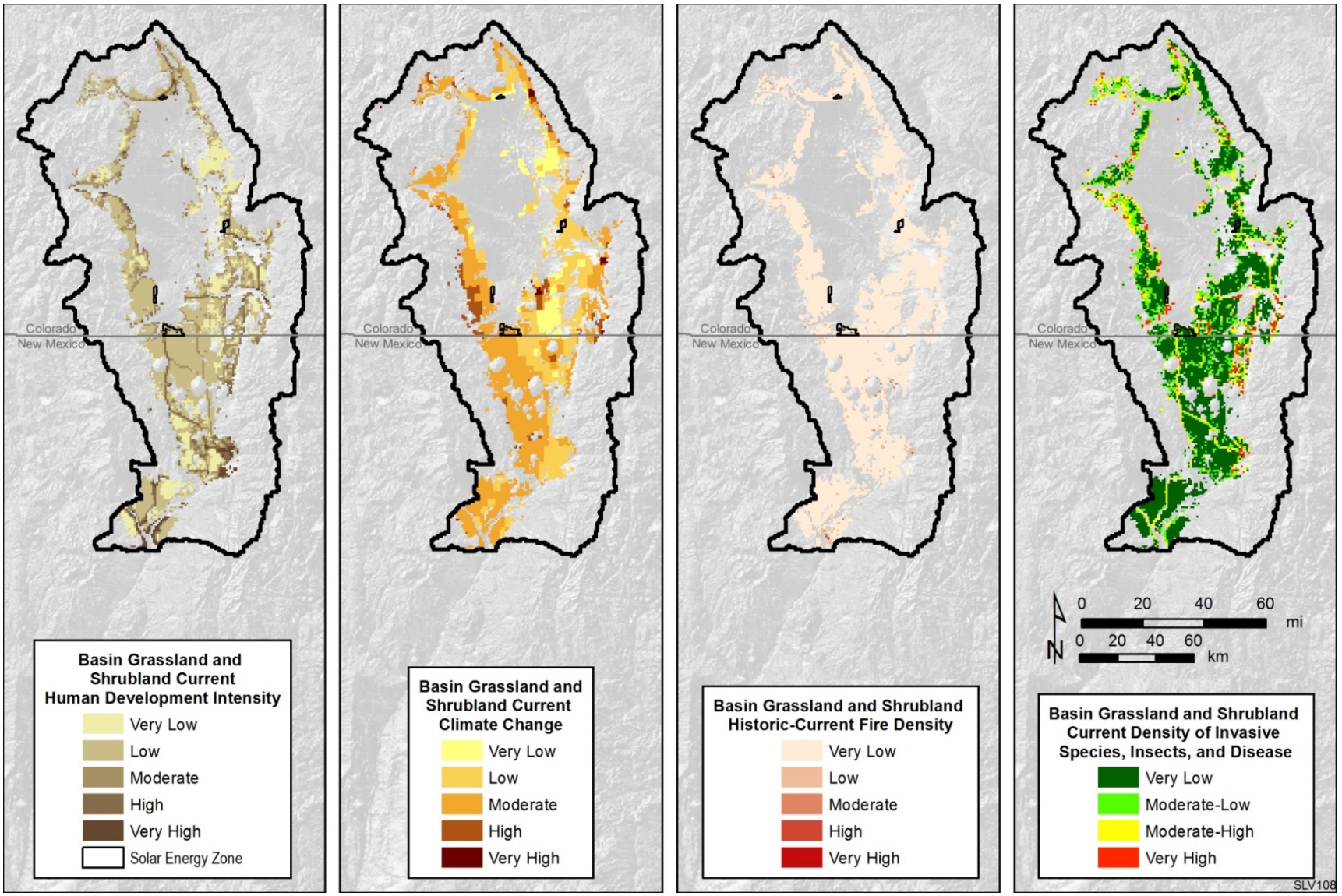

Figure 2-11. Current (2015) Distribution and Status of the Basin Grassland and Shrubland Ecological System Relative to Change Agents. Data Source: LANDFIRE EVT (USGS 2010).

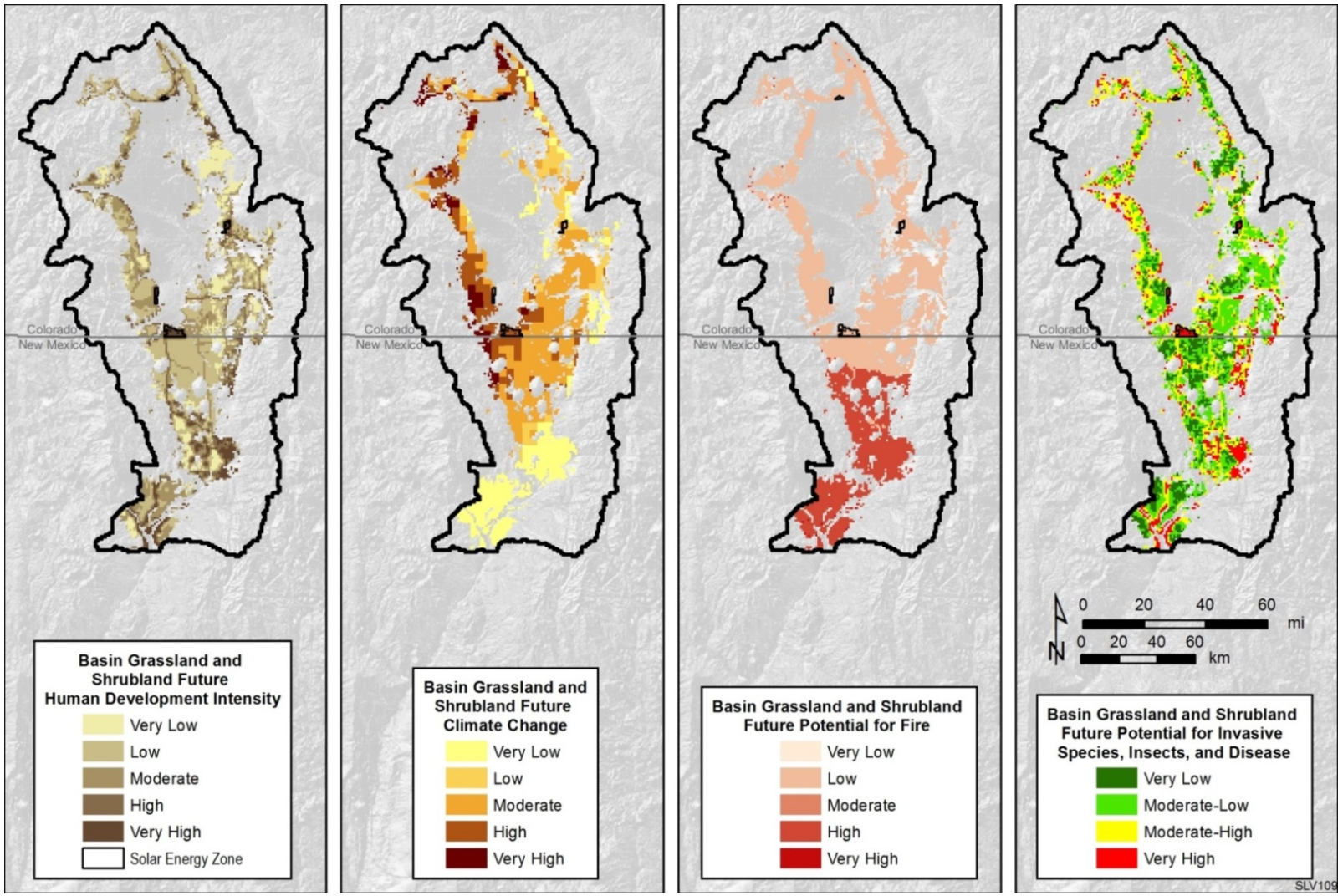

Figure 2-12. Potential Future Vulnerability of the Basin Grassland and Shrubland Ecological System to Change Agents. Data Source: LANDFIRE EVT (USGS, 2010). Future climate change projections were made for a 2040-2069 temporal period; all other future change agent models were developed for a 2015-2030 temporal period.

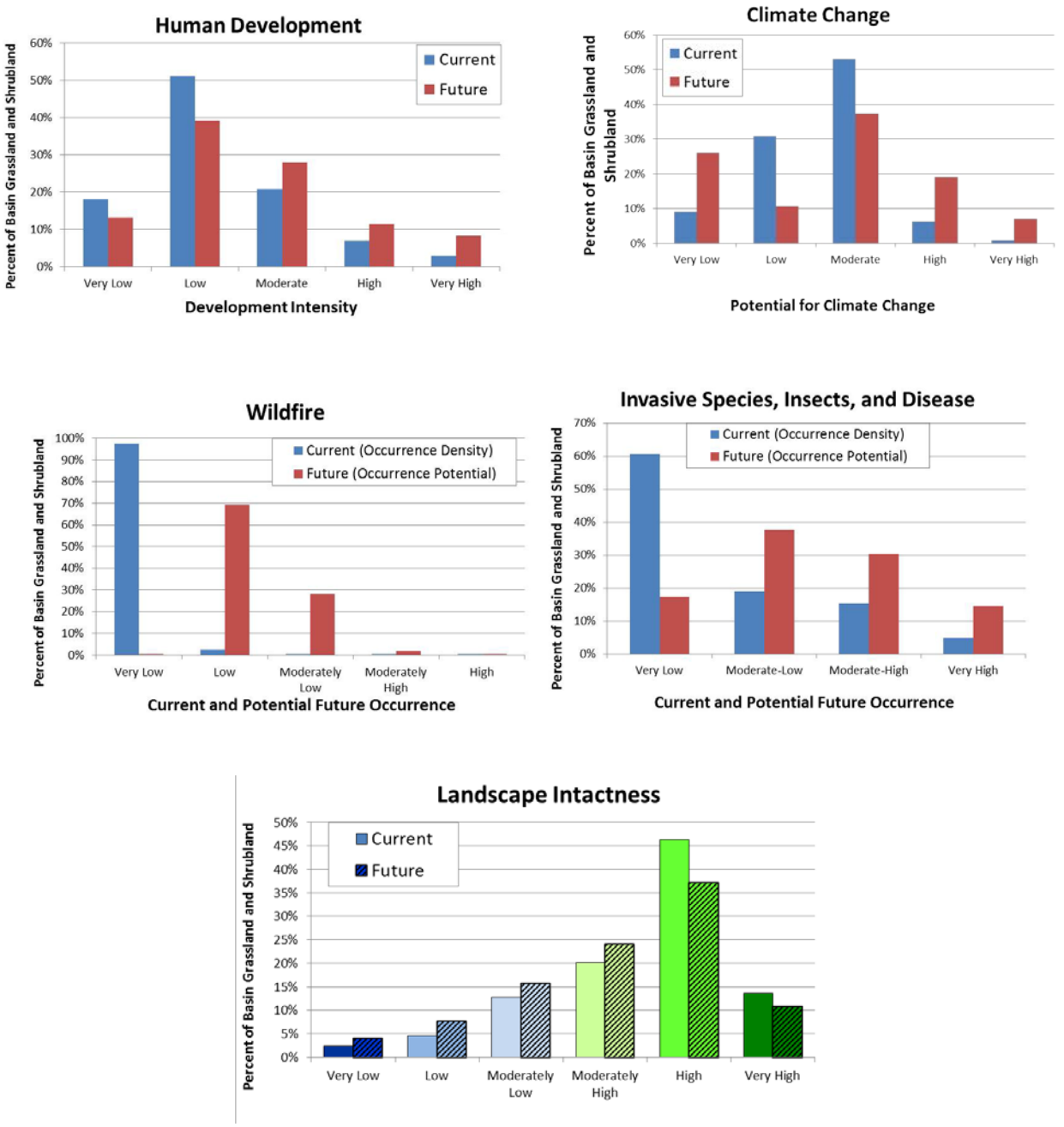

Figure 2-13. Predicted Trends in Basin Grassland and Shrubland Habitat within the Study Area

Approximately 51% of the basin grassland and shrubland systems are within areas of low current human development intensity (Figure 2-11; Figure 2-13). Future trends in human development indicate an increase in human development intensity within these systems. The amount of basin grassland and shrubland systems occurring within areas high and very high human development intensity is expected to increase by approximately 10% in the near-term (i.e., by 2030) (Figure 2-12; Figure 2-13).

The majority of basin grassland and shrubland systems are within areas of low to moderate current climate change, as measured by the relative change in current precipitation and temperature from historic baseline period precipitation and temperature (Figure 2-11; Figure 2-13). Future trends in climate change indicate portions of basin grassland and shrubland systems with high or very high potential for climate change in the long-term future (i.e., by 2069) (Figure 2-12; Figure 2-13). Approximately 26% of these systems are located in areas with high or very high potential for future climate change (Figure 2-12; Figure 2-13).

The majority of basin grassland and shrubland systems are within areas of very low current fire occurrence density (Figure 2-11; Figure 2-13). Future trends in wildfire indicate little change in wildfire potential in these systems. Over 90% of basin grassland and shrubland systems have low or moderate near-term future (i.e. by 2030) potential for wildfire (Figure 2-13). The greatest potential for future wildfire occurs in the southern portion of the distribution of these systems in New Mexico (Figure 2-12).

The majority of basin grassland and shrubland systems are within areas of very low current density of invasive species, insects, and disease (Figure 2-11; Figure 2-13). Future trends indicate an increase in potential spread of invasive species, insects, and disease in some portions of these systems in the study area (Figure 2-12; Figure 2-13). Areas of potential near-term future (i.e., by 2030) spread of invasive species, insects, and disease include areas of urban and rural human expansion and potential energy development (Figure 2-12).

2.1.6 Regional Setting-San Luis Valley-Taos Plateau Landscape

2.1.6.1 General Description

Antonito Southeast SEZ

The Antonito Southeast SEZ is situated within 5 mi (8 km) of four specially designated areas: 1 mile (1.6 km) from the Rio Grande del Norte National Monument; 5 miles (8 km) from the San Luis Hills area of critical environmental concern (ACEC); 3 miles (5 km) from the Cumbres & Toltec Scenic Railroad ACEC; and 2 miles (3 km) from the San Antonio Gorge ACEC in New Mexico. Other specially designated lands within 20 mi (32 km) of the SEZ include: Rio Grande Corridor Special Recreation Management Area (SRMA) (5 and 6 mi [10 km] from the Antonito Southeast SEZ), the San Luis Hills Wilderness Study Area (WSA) and San Antonio WSA in New Mexico (2 mi [3 km] and 6 mi [10 km] from the SEZ, and the Rio Grande Wild and Scenic River corridor in New Mexico (8.5 mi [14 km] from the SEZ).

The Antonito Southeast SEZ is located in a relatively undeveloped rural area in the south-central part of the San Luis valley basin between two large mountain ranges. The area immediately to the north and east is urban, industrial or used for agriculture. Land within the SEZ is undeveloped scrubland characteristic of a high-elevation, semiarid basin, which is used for cattle grazing. The Antonito

Southeast SEZ is located primarily within the San Luis Shrublands and Hills Level IV ecoregion, dominated by big sagebrush, rubber rabbitbrush, and winterfat, western wheatgrass, green needlegrass, blue grama, and needle-and-thread. 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, fourwing saltbush, and greasewood. These ecoregions are located within the Colorado/New Mexico Plateau Level III ecoregion. Based on LandFire Existing Vegetation Types (EVT), there are two primary vegetation communities that occur in the developable portion of the SEZ (Table 2-2): Inter-Mountain Basins Semi-Desert Shrub Steppe and Inter-Mountain Basins Mixed Salt Desert Scrub. Additional cover types within the SEZ include Inter-Mountain Basins Greasewood Flats, Inter-Mountain Basins Big Sagebrush Shrubland, and Pinyon-Juniper Woodlands. Land cover types in the vicinity of the Antonito Southeast SEZ are presented in Figure 2-14 and 2-15. Sensitive habitats on the SEZ include ephemeral dry washes.

De Tilla Gulch SEZ

The De Tilla Gulch SEZ is situated within 5 mi (8 km) of the Old Spanish National Historic Trail. The congressionally-designated route of the Old Spanish National Historic Trail parallels the southern border of the SEZ about 0.25 mi (0.4 km) south of the SEZ. There is one USFS roadless area located within 5 mi (8 km) of the SEZ. Several additional specially designated areas are within the viewshed of the SEZ.

The De Tilla Gulch SEZ is located 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 San Juan Mountains to the west and the Sangre de Cristo Range to the east form the rim of the basin. The land is undeveloped and is used for grazing. Little commercial or industrial activity exists in the surrounding area, while agricultural areas lie to the east and to the south. The SEZ is located within the San Luis Shrublands and Hills Level IV ecoregion, which supports shrublands, grasslands, and pinyon-juniper woodlands on upper elevations of the San Luis Hills. The dominant species in this ecoregion are big sagebrush, rubber rabbitbrush, winterfat, western wheatgrass, green needlegrass, blue grama, and needle-and-thread. This ecoregion is located within the Colorado/New Mexico Plateau Level III ecoregion.

Ecological Systems Conservation Elements within the ecoregion are presented in Figure 2-9. At a more local scale, land cover types in the vicinity of the De Tilla Gulch SEZ are shown in Figure 2-14 and 2-15. According to Table 2-3, there are four primary land cover types that occur within the De Tilla Gulch SEZ developable area: Inter-Mountain Basins Semi-Desert Shrub Steppe, Inter-Mountain Basins Mixed Salt Desert Scrub, Inter-Mountain Basins Greasewood Flat, and Southern Colorado Plateau Sand Shrubland. There are over ten additional cover types in the vicinity (i.e., within 5 mi, or 8 km) of the SEZ (Table 2-3). Sensitive habitats on the SEZ include ephemeral dry washes.

Table 2-2. Land Cover Types and Acreage Amounts in the Vicinity of the Antonito Southeast Solar Energy Zone (Sources: landfire.gov; Walston et al. 2016)

Landcover Types	Acres in the Ecoregion	Acres in the SEZ Developable Area	Percent of Total SEZ (%)[1]	Acres in the SEZ Affected Area (5 mi Buffer)	Percent of Affected Area (%)[2]
Natural Systems					
Inter-Mountain Basins Semi-Desert Shrub Steppe	413,347	4,413.2	45.4%	42,796.7	34.7%
Inter-Mountain Basins Mixed Salt Desert Scrub	167,464	4,200.8	43.3%	22,593.9	18.3%
Inter-Mountain Basins Greasewood Flat	432,043	668.3	6.9%	8,199.5	6.6%
Inter-Mountain Basins Big Sagebrush Shrubland	739,814	325.6	3.4%	15,194.4	12.3%
Pinyon-Juniper Woodland	160,802	12.9	0.1%	4,171.4	3.4%
Southern Rocky Mountain Ponderosa Pine Woodland	255,763	8.2	0.1%	1,763.4	1.4%
Rocky Mountain Lower Montane-Foothill Shrubland	51,229	2.2	0.0%	86.5	0.1%
Inter-Mountain Basins Semi-Desert Grassland	15,468	1.1	0.0%	163.5	0.1%
Rocky Mountain Wetland-Herbaceous	12,585	0.2	0.0%	315.6	0.3%
Southern Colorado Plateau Sand Shrubland	259,173	0.0	0.0%	1,634.8	1.3%
Rocky Mountain Subalpine/Upper Montane Riparian Systems	30,029	0.0	0.0%	1,270.8	1.0%
Rocky Mountain Montane Riparian Systems	27,755	0.0	0.0%	589.1	0.5%
Open Water	34,461	0.0	0.0%	350.0	0.3%
Southern Rocky Mountain Dry-Mesic Montane Conifer Forest and Woodland	248,042	0.0	0.0%	222.6	0.2%
Developed and Disturbed Systems					
Developed	240,237	68.7	0.7%	8,200.3	6.6%
Introduced Vegetation (i.e., invasive species)	91,295	16.2	0.2%	1,690.9	1.4%
Agriculture	430,830	0.7	0.0%	14,383.1	11.7%

[1] Values represent the percent acreage in SEZ developable area relative to the entire SEZ (9,712 acres).

[2] Values represent the percent acreage in SEZ affected area (5 mile buffer around SEZ) relative to the entire 5-mile buffer area (123,445 acres).

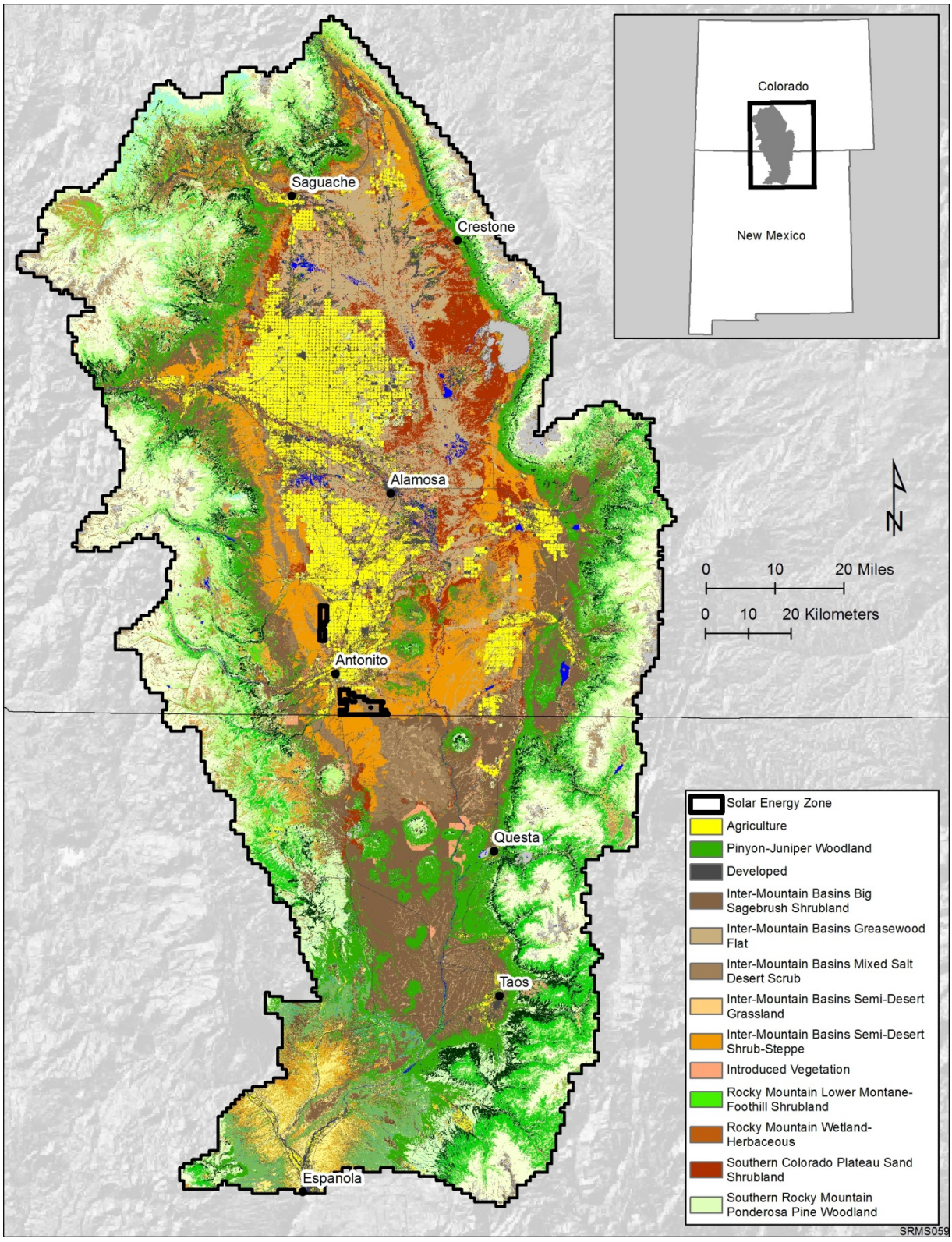

Figure 2-14. Land Cover Types in the Vicinity of the San Luis Valley-Taos Plateau Landscape Assessment Study Area (Source: landfire.gov; Walston et al. 2016)

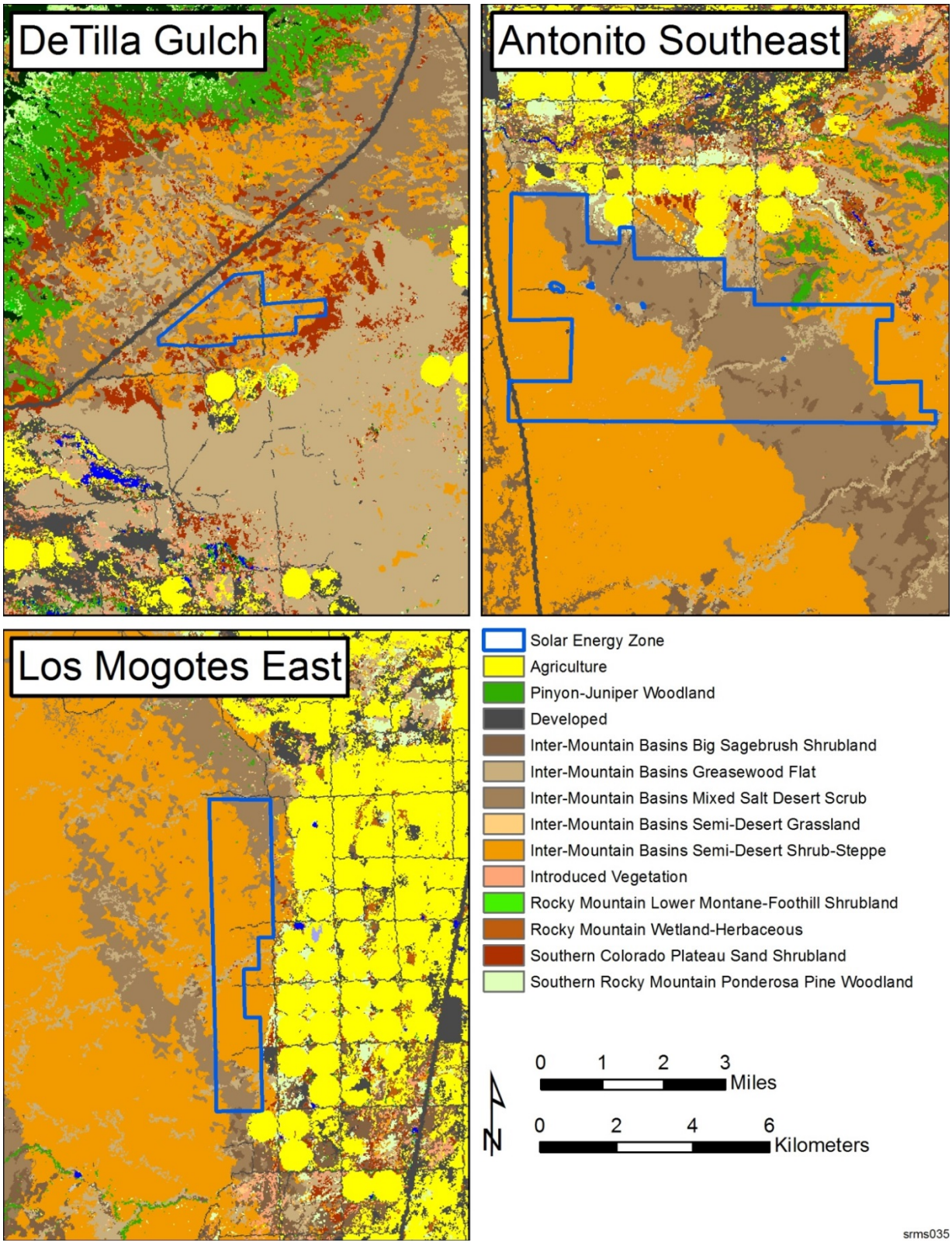

Figure 2-15. Land Cover Types in the Vicinity of the Colorado Solar Energy Zones (Source: landfire.gov; Walston et al. 2016)

Table 2-3. Land Cover Types and Amounts in the Vicinity of the De Tilla Gulch Solar Energy Zone (Sources: landfire.gov; Walston et al. 2016)

Landcover Types	Acres in the Ecoregion	Acres in the SEZ Developable Area	Percent of Total SEZ (%)[1]	Acres in the SEZ Affected Area (5 mi Buffer)	Percent of Affected Area (%)[2]
Natural Systems					
Inter-Mountain Basins Semi-Desert Shrub-Steppe	413,347	554.2	52.1%	6,916.2	9.6%
Inter-Mountain Basins Mixed Salt Desert Scrub	167,464	277.3	26.1%	9,652.1	13.4%
Inter-Mountain Basins Greasewood Flat	432,043	145.4	13.7%	22,140.0	30.8%
Southern Colorado Plateau Sand Shrubland	259,173	62.0	5.8%	5,348.4	7.4%
Rocky Mountain Lower Montane-Foothill Shrubland	51,229	2.4	0.2%	310.7	0.4%
Inter-Mountain Basins Big Sagebrush Shrubland	739,814	0.7	0.1%	2,290.4	3.2%
Inter-Mountain Basins Semi-Desert Grassland	15,468	0.4	0.0%	187.9	0.3%
Southern Rocky Mountain Ponderosa Pine Woodland	255,763	0.2	0.0%	878.5	1.2%
Pinyon-Juniper Woodland	160,802	0.0	0.0%	6,294.4	8.8%
Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland	248,042	0.0	0.0%	2,822.0	3.9%
Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland	438,093	0.0	0.0%	1,103.7	1.5%
Rocky Mountain Aspen Forest and Woodland	241,068	0.0	0.0%	822.9	1.1%
Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland	317,591	0.0	0.0%	327.1	0.5%
Open Water	34,461	0.0	0.0%	279.3	0.4%
Rocky Mountain Wetland-Herbaceous	12,585	0.0	0.0%	260.2	0.4%
Developed and Disturbed Systems					
Developed	240,237	17.6	1.7%	5,318.8	7.4%
Agriculture	430,830	0.9	0.1%	5,065.5	7.0%
Introduced Vegetation	91,295	0.7	0.1%	1,208.9	1.7%

[1] Values represent the percent acreage in SEZ developable area relative to the entire SEZ (1,064 acres).

[2] Values represent the percent acreage in SEZ affected area (5 mile buffer around SEZ) relative to the entire 5-mile buffer area (71,871 acres).

Los Mogotes East SEZ

The Los Mogotes East SEZ is situated within 5 mi (8 km) of the Los Mogotes East ACEC (located 1 mi [1.6 km] west of the SEZ). Many specially designated areas are located within 25 mi (40 km) of the Los Mogotes East SEZ. Two ACECs—San Luis Hills and Cumbres & Toltec—are located in Colorado, and the San Antonio Gorge ACEC is located in New Mexico. Two BLM-administered WSAs—San Antonio in New Mexico and San Luis Hills in Colorado—are within 10 to 12 mi (16 to 19 km) of the SEZ. Portions of two designated USFS-administered wilderness areas—South San Juan in Colorado and Cruces Basin in New Mexico—are in the viewshed of the SEZ. The SEZ is also visible from several roadless areas within the Rio Grande and Carson National Forests located to the west and south of the SEZ. Portions of U.S. 285 and CO 17 and CO 159 have been designated as the Los Caminos Antiguos Scenic Byway by both the state and BLM which passes within 3 mi (5 km) of the SEZ. The SEZ is located within the boundaries of the Sangre de Cristo National Heritage Area (NHA). The assumed route of the West Fork of the North Branch of the Old Spanish Trail parallels within 1 mi (1.6 km) the eastern boundary of the SEZ.

The Los Mogotes East SEZ is undeveloped and rural, 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 land, other than range improvements associated with the Little Mogotes grazing allotment which is currently used for grazing cattle. The Los Mogotes East 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 shadescale, fourwing saltbush, and greasewood. The northwestern portion of this SEZ is located within the San Luis Shrublands and Hills Level IV ecoregion, which supports shrublands, grasslands, and pinyon-juniper woodlands on upper elevations of the San Luis Hills. The dominant species in this ecoregion are big sagebrush, rubber rabbitbrush, winterfat, western wheatgrass, green needlegrass, blue grama, and needle-and-thread. These ecoregions are located within the Colorado/New Mexico Plateau Level III ecoregion.

Vegetation communities on and in the vicinity of the Los Mogotes East SEZ are shown in Figure 2-14 and 2-15. Existing vegetation on the SEZ is primarily Inter-Mountain Basins Semi-Desert Shrub Steppe. Additional cover types within the SEZ developable area include Inter-Mountain Basins Mixed Salt Desert Scrub and Inter-Mountain Basins Greasewood Flat. Less than 1 acre (<0.01 km^2) of agriculture occurs within the SEZ. Additional land cover types and vegetation communities occur in the vicinity (i.e., within 5 mi, or 8 km) of the SEZ (Table 2-4). Sensitive habitats on the SEZ include ephemeral dry washes.

Table 2-4. Land Cover Types and Amounts in the Vicinity of the Los Mogotes East Solar Energy Zone (Sources: landfire.gov; Walston et al. 2016)

Landcover Types	Acres in the Ecoregion	Acres in the SEZ Developable Area	Percent of Total SEZ (%)[1]	Acres in the SEZ Affected Area (5 mi Bufer)	Percent of Affected Area (%)[2]
Natural Systems					
Inter-Mountain Basins Semi-Desert Shrub Steppe	413,347	1,930.4	72.8%	27,364.7	30.0%
Inter-Mountain Basins Mixed Salt Desert Scrub	167,464	568.0	21.4%	7,788.7	8.5%
Inter-Mountain Basins Greasewood Flat	432,043	99.4	3.8%	2,976.1	3.3%
Inter-Mountain Basins Big Sagebrush Shrubland	739,814	14.2	0.5%	7,477.6	8.2%
Inter-Mountain Basins Semi-Desert Grassland	15,468	6.7	0.3%	161.4	0.2%
Southern Colorado Plateau Sand Shrubland	259,173	6.0	0.2%	660.3	0.7%
Pinyon-Juniper Woodland	160,801	2.0	0.1%	973.0	1.1%
Southern Rocky Mountain Ponderosa Pine Woodland	255,763	0.7	0.0%	1,862.1	2.0%
Rocky Mountain Subalpine-Montane Riparian Shrubland	27,755	0.0	0.0%	1,511.6	1.7%
Open Water	34,461	0.0	0.0%	124.3	0.1%
Rocky Mountain Wetland-Herbaceous	12,585	0.0	0.0%	110.1	0.1%
Rocky Mountain Aspen Forest and Woodland	241,068	0.0	0.0%	74.0	0.1%
Developed and Disturbed Systems					
Agriculture	430,830	0.7	0.0%	30,506.3	33.5%
Developed	240,237	23.8	0.9%	8,106.0	8.9%
Introduced Vegetation	91,295	0.4	0.0%	1,278.1	1.4%

[1] Values represent the percent acreage in SEZ developable area relative to the entire SEZ (2,650 acres).

[2] Values represent the percent acreage in SEZ affected area (5 mile buffer around SEZ) relative to the entire 5-mile buffer area (91,189 acres)

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2.1.6.2 Regional Ecological/Biological Conditions and Trends

The San Luis Valley – Taos Plateau Level IV Ecoregion Landscape Assessment presents a framework for determining the condition and trend of various resource values and conservation elements in the ecoregion. The CEs selected for the LA were related to one of five topical areas: Ecological Systems, Focal Species, Sites of Conservation Concern, Ecosystem Functions, and Cultural and Historic Conservation Elements. Conservation Elements could also include other resource values, such as highly erodible soils; populations of wild horses and burros; scenic viewsheds; or designated sites of natural, historical, or cultural significance.

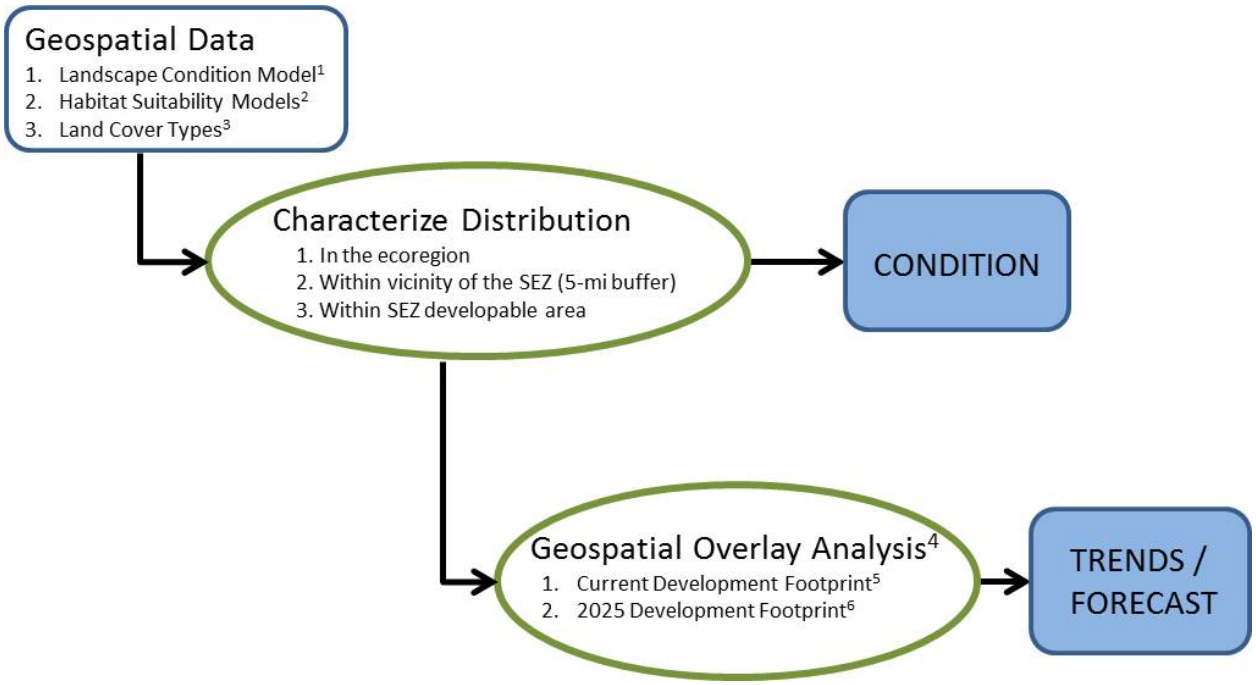
Problematic trends are understood by forecasting the interaction of conservation elements with the change agents in the ecoregion. The four change agents include fire, invasive species, climate change, and human development. Of these change agents, the conservation element vulnerability to human development and climate change are used in this assessment to evaluate resource conditions and trends.[8] The landscape intactness models were used as indicators of current and future human development because the landscape intactness models were largely constructed from human development input datasets (Section 2.1.4; Walston et al. 2016).

Understanding the problematic conservation element trends relevant to the Colorado SEZs was accomplished through (1) a geospatial analysis of available ecoregional data; (2) expert opinion by the BLM IDT[9]; and (3) comments from knowledgeable stakeholders. Figure 2-16 presents a conceptual illustration of the geospatial framework for determining the condition and trends of conservation elements in the ecoregion. The geospatial data used in this assessment are available publicly from open sources. These data include the Landscape Intactness model for the San Luis Valley (see Section 2.1.4), modeled land cover types, and species-specific habitat suitability models. Evaluating condition and trends of the Conservation Elements (land cover and habitats) in an ecoregional context will provide a better understanding of the impacts of solar energy development within the Colorado SEZs relative to the rest of the ecoregion.

Quantitatively evaluating condition and trends for Conservation Elements is informed by an understanding of the distribution of the Conservation Element within identified analysis areas: (1) the entire San Luis Valley – Taos Plateau Level IV ecoregion, (2) vicinity of the Colorado SEZs, and (3) within each of the Colorado SEZs developable areas. Trends are understood by intersecting these Conservation Elements to the current and future landscape intactness models to evaluate conditions and trends based on human development. In addition, models used in the LA regarding the potential for future climate change within broad-scale ecological systems Conservation Elements were used to understand resource trends related to climate change.

[8] Conditions and trends of Conservation Elements evaluated in this SRMS considered the human development (including agriculture and grazing) and climate change REA change agents. These two change agents are fundamental drivers of landscape change as they influence, at least in part, other change agents (e.g., invasive species, wildfire). The landscape intactness models were used as indicators of current and future human development as the landscape intactness models were largely constructed from human development input datasets (Section 2.1.4; Walston et al. 2016).

[9] An interdisciplinary team (IDT) of resource specialists from the BLM San Luis Valley and Taos field offices, the state Renewable Energy Coordination office, and Argonne National Laboratory.



[1] The landscape intactness model is available from and described in the San Luis Valley – Taos Plateau Level IV Ecoregion Landscape Assessment.
[2] Habitat suitability models are available from the San Luis Valley – Taos Plateau Level IV Ecoregion Landscape Assessment.
[3] Land cover types are available from the San Luis Valley – Taos Plateau Level IV Ecoregion Landscape Assessment.
[4] The overlay change agent/conservation element analysis was conducted to determine geospatial trends. Geospatial data for the change agent were overlain with the distribution of conservation elements to determine current and future distributions of the conservation elements.
[5] Geospatial data for the current human development footprint model are available from and described in the San Luis Valley – Taos Plateau Level IV Ecoregion Landscape Assessment.
[6] Geospatial data for the future (approximately 2025) human development footprint model are available from and described in the San Luis Valley – Taos Plateau Level IV Ecoregion Landscape Assessment.

Figure 2-16. Conceptual Diagram for Estimating Condition and Trends of Conservation Elements in the San Luis Valley-Taos Plateau for the Three Colorado Solar Energy Zones

A generalized summary of conditions and trends for the four broad Ecological Systems across the ecoregion is provided in Table 2-5. Due to the large number of Conservation Elements that could potentially be evaluated, the trends analysis focused on these broad systems (Figure 2-9), which were assumed to be suitable indicators for other Conservation Elements (such as wildlife species habitat). The information presented in Table 2-5 was based upon the Landscape Assessment (Walston et al. 2016) that evaluated the potential for these four Ecological Systems to interact with the Change Agents. Similarly, a generalized summary of conditions and trends for the SEZs is provided in Table 2-6.

The condition and trends of Ecological Systems Conservation Elements in each of the SEZs is provided in Tables 2-7 through 2-9. General current conditions of the SEZs, based on summarized landscape intactness model results, are similar to the surrounding ecoregion (moderately high). Future landscape intactness across the ecoregion is not expected to noticeably change as a result of human development. However, general intactness of the SEZs is expected to decline at a rate greater than the surrounding ecoregion due to assumed solar energy development on the SEZs, thus resulting in 'very

TABLE 2-5. Summary of Condition and Trends for Ecological Systems Conservation Elements in the San Luis Valley/Taos Plateau Ecoregion[1]

Ecoregional Condition and Trends Assessment								
	Landscape Intactness[2]		Climate Change[3]		Wildfire		Invasive Species, Insects, and Disease	
Ecological System Conservation Element Name	Average Current Intactness Across Ecoregion	Average Future Intactness Across Ecoregion	Average Current Climate Change (Relative to Historic)	Average Future Potential for Climate Change	Average Current Distribution of Wildfire	Average Future Potential for Wildfire	Average Current Distribution of Invasive Species, Insects, and Disease	Average Future Potential for Invasive Species, Insects, and Disease
Basin Grassland & Shrubland	Moderately High	Moderately High	Moderate	Moderate	Very Low	Low	Very Low	Moderately Low
Riparian & Wetland Systems (includes greasewood)	Moderately High	Moderately High	Moderate	Moderate	Very Low	Low	Moderately High	Very High
Pinon-Juniper Woodland	High	Moderately High	Moderate	Low	Very Low	Moderately Low	Very Low	Moderately Low
Montane & Subalpine Conifer Forest	Very High	High	High	Moderate	Very Low	Low	Very High	Very High

[1] Based on evaluation of Ecological Systems Conservation Elements in the Landscape Assessment for the San Luis Valley – Taos Plateau Level IV Ecoregion (Walston et al. 2016). Colors in cells represent the symbology used in Figures 2-5 and 2-8.

[2] The landscape intactness models were used as indicators of current and future human development because the landscape intactness models were developed from human development input datasets (Section 2.1.4; Walston et al. 2016).

[3] Like other ecological resources, the response of these systems to climate change may not be closely related to the potential magnitude of the change in future precipitation or temperature. For example, previous assessments regarding the response of piñon-juniper systems to climate change have indicated a range-wide decrease of as much as 31%, primarily as a function of the change in mean winter precipitation (van Riper et al. 2014).

Table 2-6. Condition and Trends Summary for the Three Colorado Solar Energy Zones[1]

SEZ[3]	Landscape Intactness[2]				Climate Change Assessment	
	Average Current Intactness in SEZ[4]	Average Current Intactness in Ecoregion	Average Near-Term Future Intactness in SEZ	Average Near-Term Future Intactness in Ecoregion	Average Potential for Future Climate Change of the SEZ	Average Potential for Future Climate Change in Ecoregion
Antonito Southeast (9,712 acres)	Moderately High (0.579)	Moderately High (0.678)	Very Low (0.100)	Moderately High (0.623)	High	Moderate
DeTilla Gulch (1,064 acres)	Moderately High (0.549)		Very Low (0.100)		High	
Los Mogotes East (2,650 acres)	Moderately High (0.589)		Very Low (0.100)		High	

[1] Colors of the cells match the symbology of the maps presented in Figures 2-4 and 2-7.
[2] Landscape intactness was used as a proxy for human development because the current landscape intactness models incorporated measures of human development.
[3] Values in parentheses represent the total developable area for the SEZ.
[4] Values in parentheses represent the average intactness model value.

TABLE 2-7. Condition and Trends Assessment for Ecological Systems Conservation Elements in the San Luis Valley/Taos Plateau Ecoregion Relevant to the Antonito Southeast Solar Energy Zone[1]

					Ecoregional Condition and Trends Assessment					
					Landscape Intactness[3]				Impact of Future Climate Change[4]	
Ecological System Conservation Element Name	Acres within the SEZ Developable Area	Percent of SEZ[2]	Ecoregional Distribution (Acres)	Percent of Ecoregion	Average Current Intactness in SEZ Developable Area	Average Current Intactness Across Ecoregion	Average Future Intactness in SEZ Developable Area	Average Future Intactness Across Ecoregion	Average Future Potential for Climate Change in SEZ Developable Area	Average Future Potential for Climate Change Across Ecoregion
Basin Grassland & Shrubland	8,940.9	92.1%	1,642,200	26.2%	Moderately High	Moderately High	Very Low	Moderately High	High	Moderate
Riparian & Wetland Systems (includes greasewood)	656.5	6.8%	787,188	12.6%	Moderately High	Moderately High	Very Low	Moderately High	High	Moderate
Pinon-Juniper Woodland	12.9	0.1%	540,900	8.6%	Moderately High	High	Very Low	Moderately High	High	Low
Montane & Subalpine Conifer Forest	8.2	<0.1%	2,208,900	35.2%	Moderately High	Very High	Very Low	High	High	Moderate
TOTAL	9,618.5	99.0%	5,179,188	82.6%						

[1] Based on evaluation of Ecological Systems Conservation Elements in the Landscape Assessment for the San Luis Valley – Taos Plateau Level IV Ecoregion (Walston et al. 2015). Colors in cells represent the symbology used in Figures 2-5 and 2-8.

[2] Percentage was based on size of the SEZ developable area (9,712 acres).

[3] The landscape intactness models were used as indicators of current and future human development because the landscape intactness models were developed from human development input datasets (Section 2.1.4; Walston et al. 2016). Solar development on the SEZs was assumed to contribute to the decline in future intactness on the SEZs.

[4] Climate change models developed for the LA were based on predicted future seasonal changes in precipitation and temperature. See Figure 2-8.

TABLE 2-8. Condition and Trends Assessment for Ecological Systems Conservation Elements in the San Luis Valley/Taos Plateau Ecoregion Relevant to the De Tilla Gulch Solar Energy Zone[1]

					Ecoregional Condition and Trends Assessment					
					Landscape Intactness[3]				Impact of Future Climate Change[4]	
Ecological System Conservation Element Name	Acres within the SEZ Developable Area	Percent of SEZ[2]	Ecoregional Distribution (Acres)	Percent of Ecoregion	Average Current Intactness in SEZ Developable Area	Average Current Intactness Across Ecoregion	Average Future Intactness in SEZ Developable Area	Average Future Intactness Across Ecoregion	Average Future Potential for Climate Change in SEZ Developable Area	Average Future Potential for Climate Change Across Ecoregion
Basin Grassland & Shrubland	894.7	84.1%	1,642,200	26.2%	Moderately High	Moderately High	Very Low	Moderately High	High	Moderate
Riparian & Wetland Systems (includes greasewood)	135.7	12.8%	787,188	12.6%	Moderately High	Moderately High	Very Low	Moderately High	High	Moderate
Pinon-Juniper Woodland	0	0	540,900	8.6%	Moderately High	High	Very Low	Moderately High	High	Low
Montane & Subalpine Conifer Forest	0.2	<0.1%	2,208,900	35.2%	Moderately High	Very High	Very Low	High	High	Moderate
TOTAL	1,030.6	96.9%	5,179,188	82.6%						

[1] Based on evaluation of Ecological Systems Conservation Elements in the Landscape Assessment for the San Luis Valley – Taos Plateau Level IV Ecoregion (Walston et al. 2015). Colors in cells represent the symbology used in Figures 2-5 and 2-8.

[2] Percentage was based on size of the SEZ developable area (1,064 acres).

[3] The landscape intactness models were used as indicators of current and future human development because the landscape intactness models were developed from human development input datasets (Section 2.1.4; Walston et al. 2016).

[4] Climate change models developed for the LA were based on future seasonal changes in precipitation and temperature. See Figure 2-8.

TABLE 2-9. Condition and Trends Assessment for Ecological Systems Conservation Elements in the San Luis Valley/Taos Plateau Ecoregion Relevant to the Los Mogotes East Solar Energy Zone[1]

					Ecoregional Condition and Trends Assessment					
					Landscape Intactness[3]				Impact of Future Climate Change[4]	
Ecological System Conservation Element Name	Acres within the SEZ Developable Area	Percent of SEZ[2]	Ecoregional Distribution (Acres)	Percent of Ecoregion	Average Current Intactness in SEZ Developable Area	Average Current Intactness Across Ecoregion	Average Future Intactness in SEZ Developable Area	Average Future Intactness Across Ecoregion	Average Future Potential for Climate Change in SEZ Developable Area	Average Future Potential for Climate Change Across Ecoregion
Basin Grassland & Shrubland	2,525.3	95.3%	1,642,200	26.2%	Moderately High	Moderately High	Very Low	Moderately High	High	Moderate
Riparian & Wetland Systems (includes greasewood)	93.4	3.5%	787,188	12.6%	Moderately High	Moderately High	Very Low	Moderately High	High	Moderate
Pinon-Juniper Woodland	2.0	<0.01%	540,900	8.6%	Moderately High	High	Very Low	Moderately High	High	Low
Montane & Subalpine Conifer Forest	0.7	<0.01%	2,208,900	35.2%	Moderately High	Very High	Very Low	High	High	Moderate
TOTAL	2,621.4	98.9%	5,179,188	82.6%						

[1] Based on evaluation of Ecological Systems Conservation Elements in the Landscape Assessment for the San Luis Valley – Taos Plateau Level IV Ecoregion (Walston et al. 2015). Colors in cells represent the symbology used in Figures 2-5 and 2-8.

[2] Percentage was based on size of the SEZ developable area (2,650 acres).

[3] The landscape intactness models were used as indicators of current and future human development because the landscape intactness models were developed from human development input datasets
(Section 2.1.4; Walston et al. 2016).

[4] Climate change models developed for the LA were based on future seasonal changes in precipitation and temperature. See Figure 2-8.

low' future intactness of the SEZs. The SEZs also have a greater potential to experience future climate change than the surrounding ecoregion (Table 2-6).

Based on the results presented in Table 2-5, little change in landscape intactness within the Ecological Systems is expected across the ecoregion as a result of human development. However, future changes in landscape intactness are more locally pronounced, as evident in the Poncha Pass, Conejos, and the Baca areas of the regions. Within the SEZs, assumed solar energy development is expected to reduce the intactness of all Ecological Systems to 'very low' intactness. On average, all Ecological Systems within the SEZs have a greater overall potential to experience future climate change in the SEZs than elsewhere within their ecoregional distributions. Because the Basin Grassland and Shrubland Ecological System comprised the largest portion of the Colorado SEZs (12,360 total acres; 92% of all SEZs), the cumulative expected future loss or degradation of this Ecological System due to human development and climate change was considered to be a regionally important trend for that vegetation system and other conservation elements relative to the Colorado SEZs.

2.1.6.3 Regional Cultural Conditions and Trends

The San Luis Valley – Taos Plateau Level IV Ecoregion Landscape Assessment is discussed in Section 2.1.6.2, and provides a mechanism for analyzing and explaining conditions and trends regarding the ecological environment at a landscape scale. The BLM is using a similar landscape approach to evaluate the condition and trends of cultural resources in the San Luis Valley-Taos Plateau (Wescott et al. 2016). The *San Luis Valley-Taos Plateau Landscape-Level Cultural Heritage Values and Risk Assessment* is a BLM pilot project designed to see whether the REA framework (already established and implemented throughout many ecoregions in the West) can be applied to the cultural environment. The San Luis Valley-Taos Plateau is a Level IV ecoregion, so slightly smaller than the Level III ecoregions typically studied for the REAs, but is well-suited for the cultural assessment. The Level III ecoregional boundaries correspond well to landscape features that have defined the cultural movements, land uses, and viewsheds within the area for thousands of years and that continue today. A fundamental purpose of the assessment is not only to capture data regarding the past activities that have shaped the collective history and cultural heritage of the region, but to get a glimpse of the future and how various change agents (human development, climate change, wildfire, and invasive species; as described in Section 2.1.6.2) might affect those resources. The expert knowledge of experienced BLM, Forest Service, Park Service, and Fish and Wildlife Service staff and many others who have lived and worked in the San Luis Valley-Taos Plateau were critical in the assessment for identifying conservation elements and establishing the baseline data set of what is currently known and culturally valued at the ecoregional scale.

The Landscape-Level Cultural Heritage Values and Risk Assessment (Wescott et al. 2016) looked at seven conservation elements that were viewed as key components of the cultural landscape:

- Places of Cultural Importance to Tribes
- Traditional Resource Collection Areas
- Trails, Passes, and Travel Corridors
- Hispano Land Grants, Communal Use Patterns, and Places of Cultural Importance
- Eligible Prehistoric Properties
- Eligible Historic Properties
- Paleontology

Readily available data were compiled spatially, including narrative information available in historic context documents and ethnographies.[10] No field work or intensive literature reviews were conducted for the purposes of the assessment, but existing detailed spatial data of surveys and sites were incorporated from the Colorado and New Mexico State Historic Preservation Offices. A graded scale image of areas containing multiple resources contributing to the seven cultural conservation elements is presented in Figure 2-17.

Non-cultural data sets (e.g., land cover types, vegetation communities) on the baseline environmental conditions were identical to those used for the ecological assessment. All of the change agent data sets were also the same. However, the derived models for landscape intactness were not applicable for use in the Landscape-Level Cultural Heritage Values and Risk Assessment, because the parameters for landscape intactness (or naturalness) do not tell a complete story about intactness of a cultural landscape, especially when that story is tied to some sort of landscape modification. Instead, using the same underlying data set on human development, a number of parameters were established to create an image of cultural landscape condition based on degree of influence of a development-related activity on a cultural resource. For example, presence of a dirt road may adversely affect resources by creating access that may lead to inadvertent or purposeful damage to a site. There is a distance at which that effect may be at its highest and then decline beyond that point. These types of variables were taken into account to create the following illustration of current and future cultural landscape condition based on development activities (Figure 2-18).

Impacts on cultural resources are not limited to direct physical impact on a property or site. Other types of impacts such as visual intrusions and auditory disturbances can affect one's capacity to use or enjoy a place of cultural importance. This can include, but is certainly not limited to, impacts on a tribal member's ability to perform or participate in a traditional ceremony, a trail enthusiast's ability to hike along a National Historic Trail route and experience the setting of those who traversed the trail during its period of significance, a researcher's ability to search for answers to landscape level questions because the landscape no longer looks the same, and possibly even a Hispano farmer's ability to enjoy the experience of traditional agricultural practices in a traditional setting. These are the landscape-level types of cultural values that the Landscape-Level Cultural Heritage Values and Risk Assessment attempts to address in terms of where these resources (cultural conservation elements) are and where they are subject to future risk not only from development, but also from other change agents.

To address less tangible impacts like visual impacts, a viewshed analysis was conducted to look at a number of key observation points within the ecoregion tied to specific cultural resources with a known setting component that is vital to the resource (as examples, Blanca Peak and the Old Spanish National Historic Trail). The viewshed analysis (Figure 2-19) took into account intervening topography that may preclude a view, but otherwise provided a buffered extension to the cultural value footprint of certain resources. The viewshed analysis also considered distance as a weighting factor, so the derived cultural value of the area declined as the distance from the resource increased.

In addition to the presence of cultural conservation elements and select viewsheds, the following were also considered: the lack of cultural resource surveys in the ecoregion, the potential for additional resources to be present, and how these factors affect our current understanding of cultural

[10] Of particular importance was an ethnographic study conducted to obtain cultural/historical information on sacred landscapes and Traditional Cultural Properties, specifically in relation to impacts of solar development in the SEZs on these resources (Higgins et al. 2013).

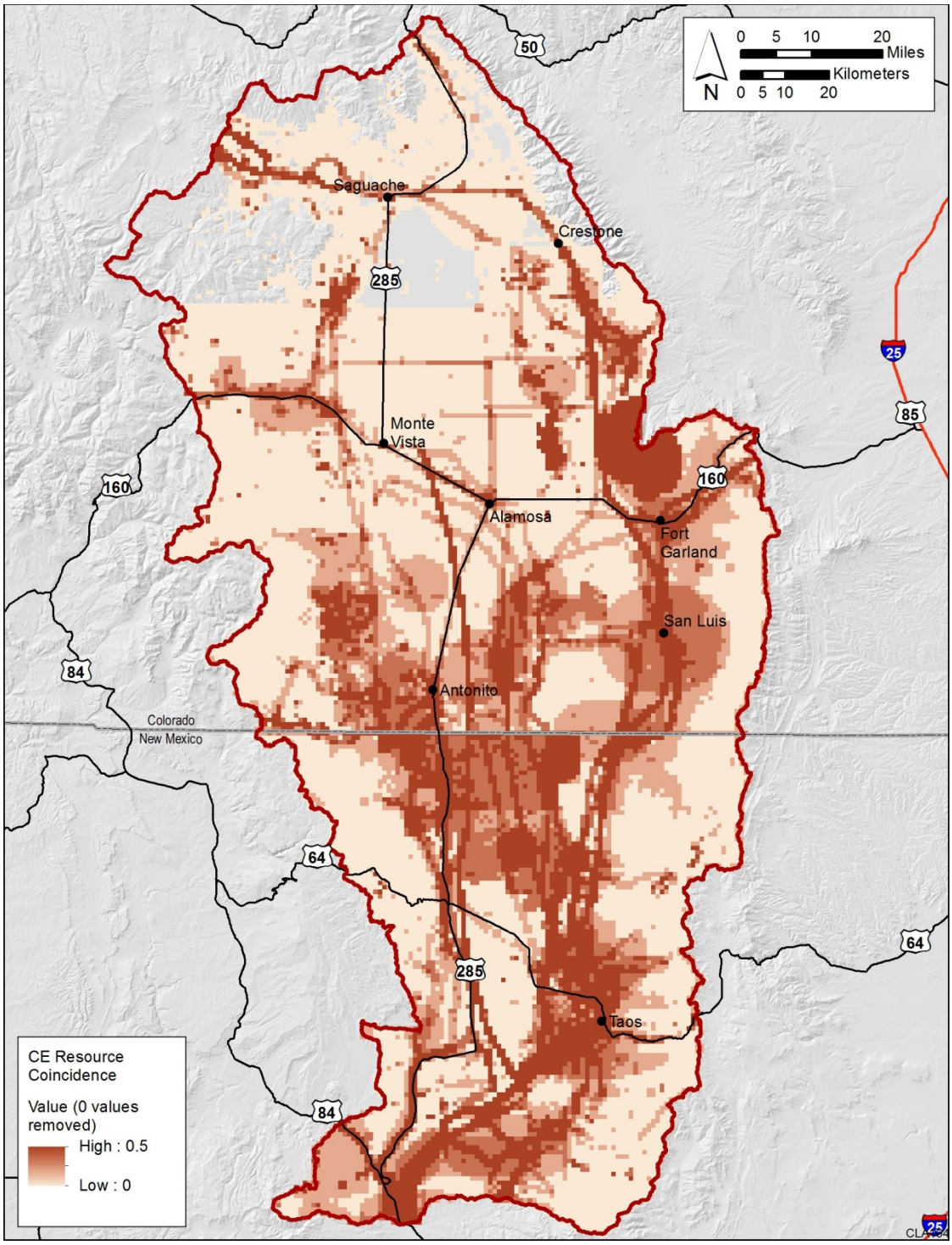


Figure 2-17. Distribution of Cultural Conservation Element Resources in the San Luis Valley-Taos Plateau

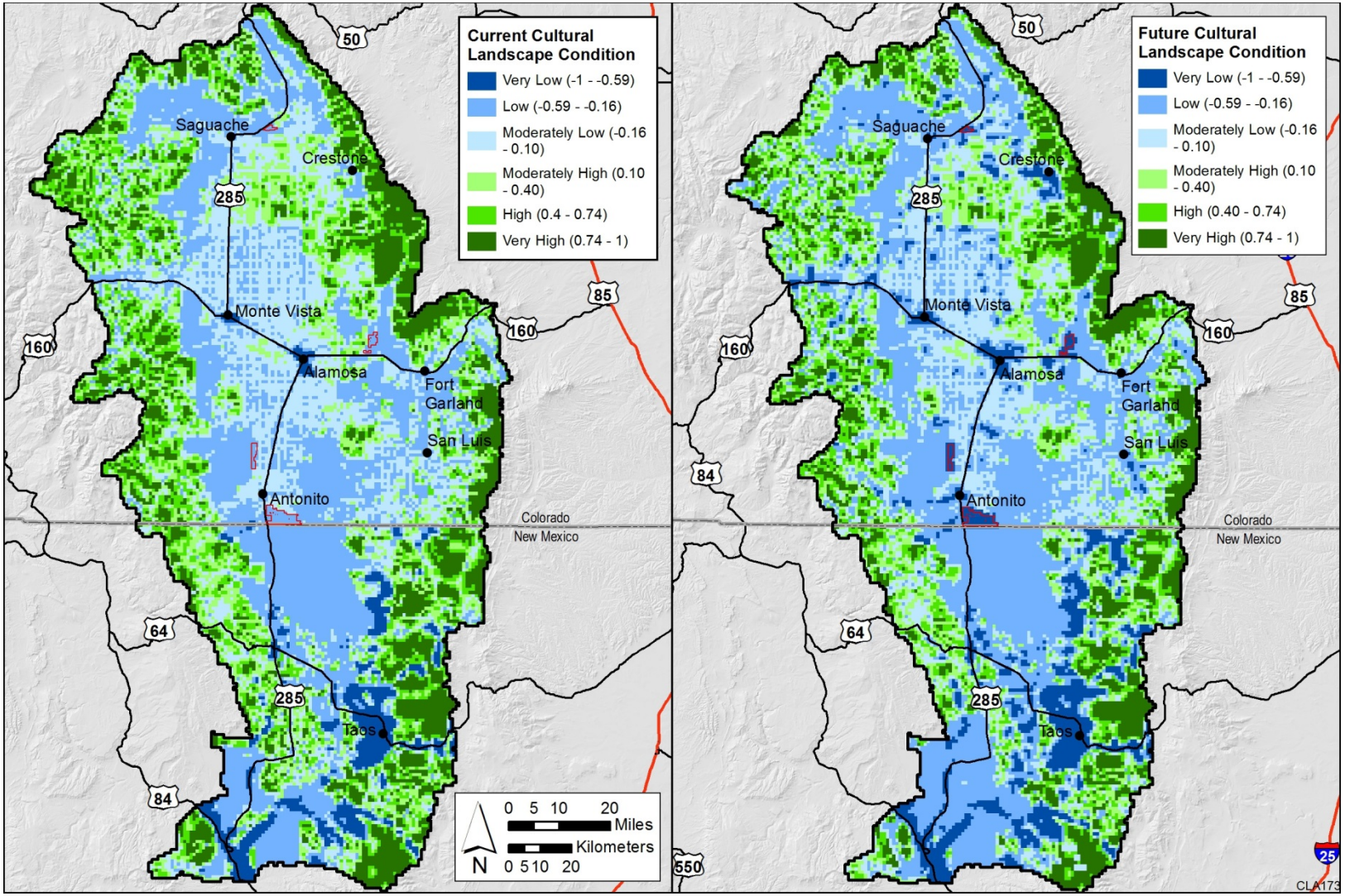


Figure 2-18. Current and Future Cultural Landscape Condition in the San Luis Valley-Taos Plateau

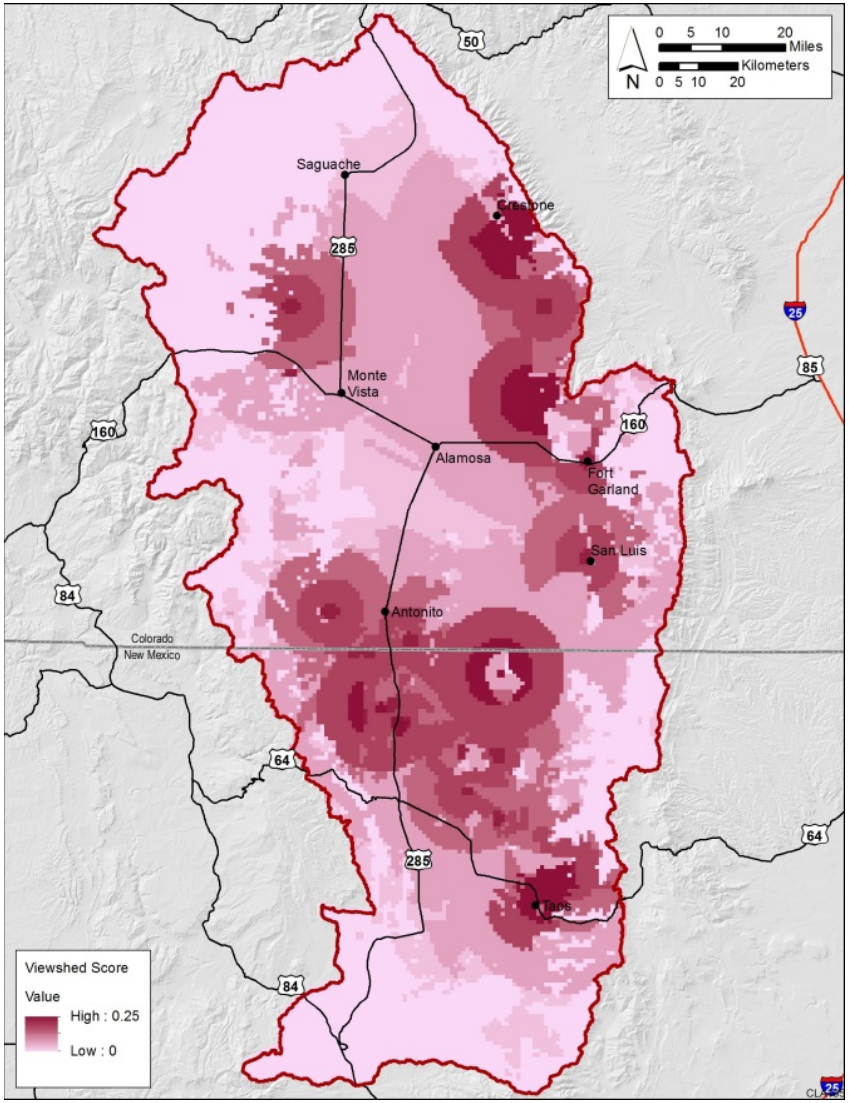


Figure 2-19. Viewshed Analysis for the Landscape-Level Cultural Heritage Values and Risk Assessment

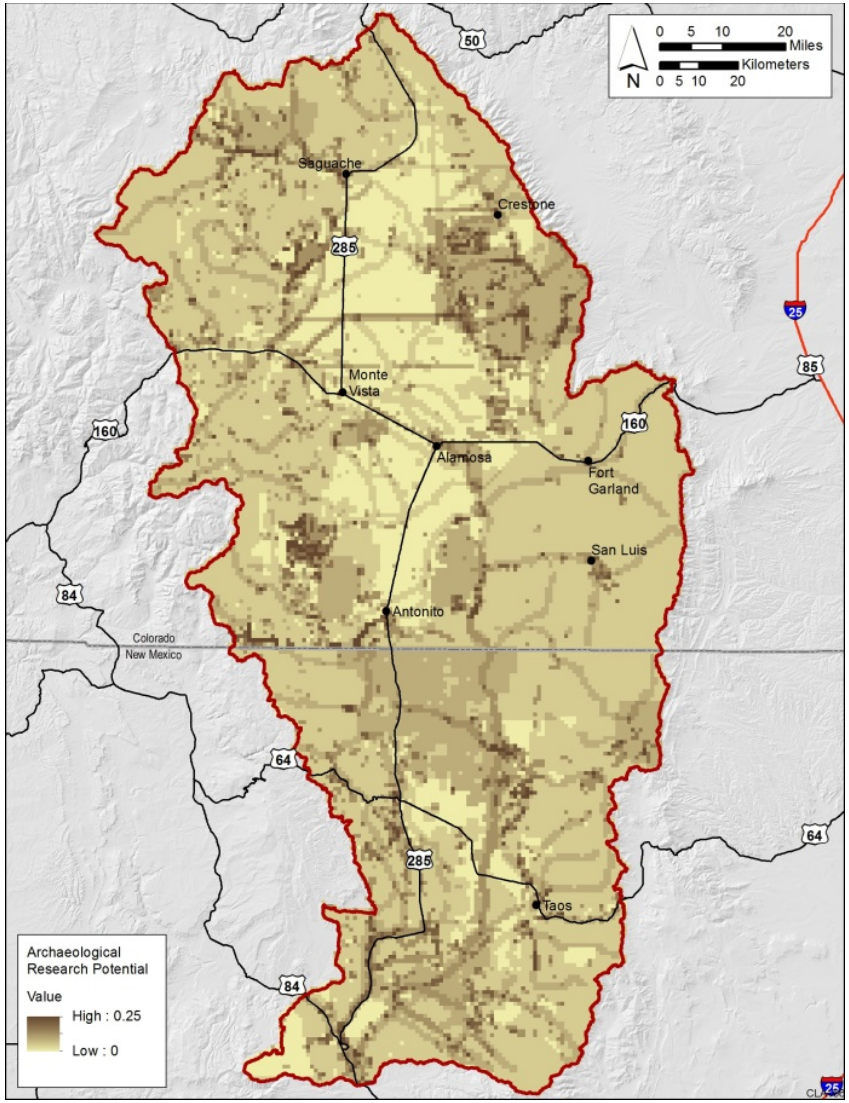


Figure 2-20. Archaeological Research Potential for the Landscape-Level Cultural Heritage Values and Risk Assessment

resource distributions. An archaeological research potential model (Figure 2-20) was created to take into account some of that uncertainty due to lack of survey and research and also to consider the areas of known higher potential, like along water courses. The intent of the model is not to predict where resources are located but to incorporate areas that might offer opportunities for research, conservation, and possibly mitigation in future planning efforts.

In the Landscape-Level Cultural Heritage Values and Risk Assessment, all of the above factors: presence of resources, viewshed value, and research potential, produce the "cultural value" of a given area (Figure 2-21). The next step in the assessment was to determine the trends and determine what may be at future risk based on the trajectories of the change agents. Figure 2-22 shows the results of how risk was calculated using the modeling of future conditions for areas likely to experience climate change, wildfire, and spread of invasive species, as well as the added areas of anticipated future new development. Each of the change agents was weighted equally in this modeling exercise. However, the change agent weighting in the model could be adjusted if it is determined to be likely that certain change agents affect cultural resources more heavily than others.

The resulting trends evaluation indicated that there are certain areas in the ecoregion that have both high cultural value and high levels of risk of change from the change agents (areas shown in red in Figure 2-23). These areas are potentially at greatest risk for possible loss or degradation and may require near term actions, such as: fencing, data recovery, erosion control, administrative protections, mitigation effectiveness monitoring, etc. The recommended actions and time frames would be dependent on resource-specific factors, setting, and the parameters in the model that indicate the sources of highest risk. Similarly, for certain areas in the ecoregion the evaluation indicated high cultural value paired with low levels of risk from the change agents (areas shown in green in Figure 2-23). These areas are potentially very stable locations that may make excellent research areas, conservation areas, or preserves depending on the resources present and their integrity.

The results of the Landscape-Level Cultural Heritage Values and Risk Assessment indicated that the areas in and around the Fourmile SEZ have a high cultural value. This information, as well as available ethnographic information (Higgins et al. 2013) supports BLM rationale to conduct NEPA land use planning to assess the proposed action of identifying the SEZ as an area excluded from solar energy development (see Section 1.3).

The results of the Landscape-Level Cultural Heritage Values and Risk Assessment also can support regional compensatory mitigation evaluations, through identifying the cultural value and risk level of potential mitigation actions and locations. The BLM's identification of locations with both high ecological value and high cultural value, where compensatory mitigation would have additive benefits, is particularly valuable.

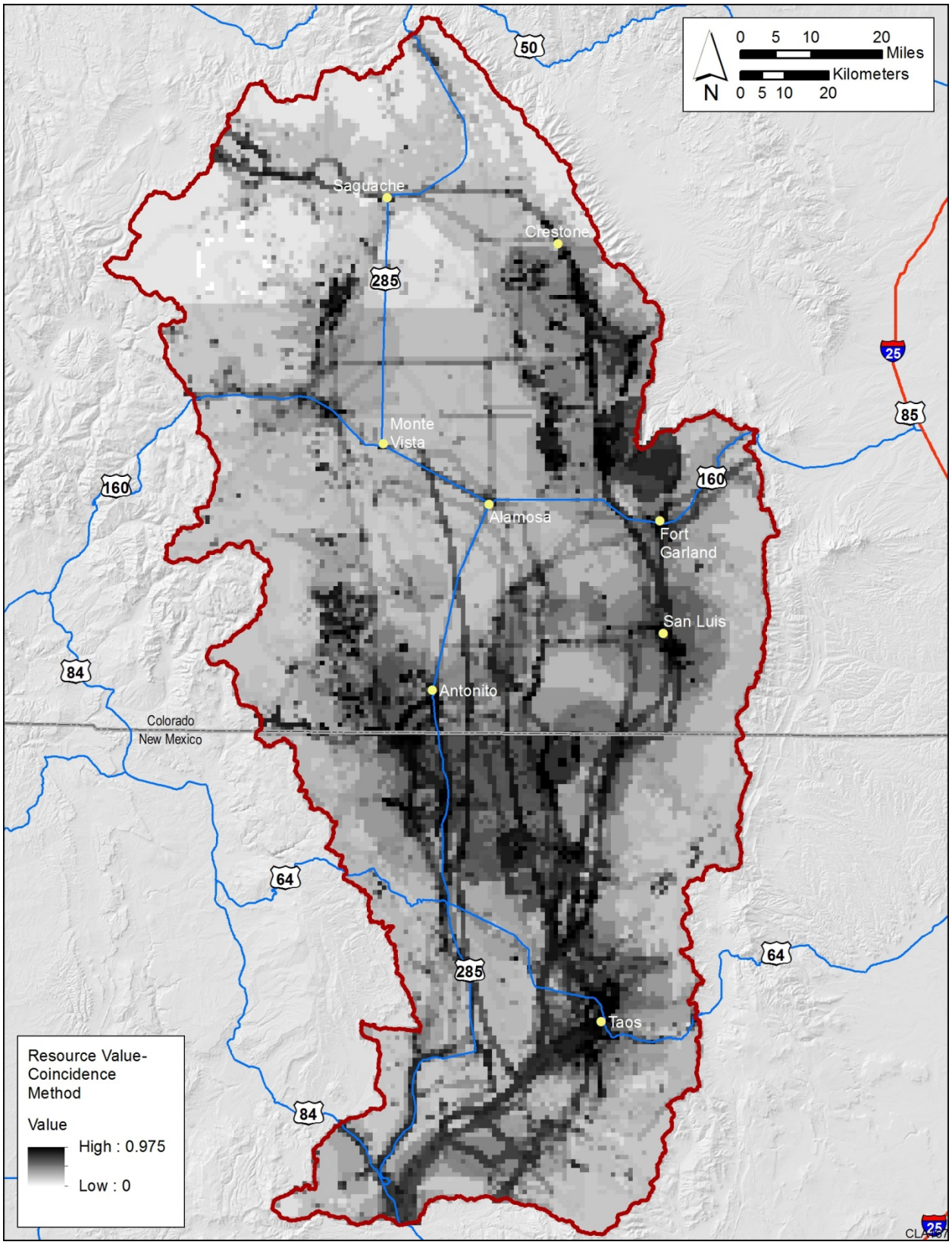


Figure 2-21. Landscape-Level Cultural Heritage Values and Risk Assessment: Cultural Resource Values

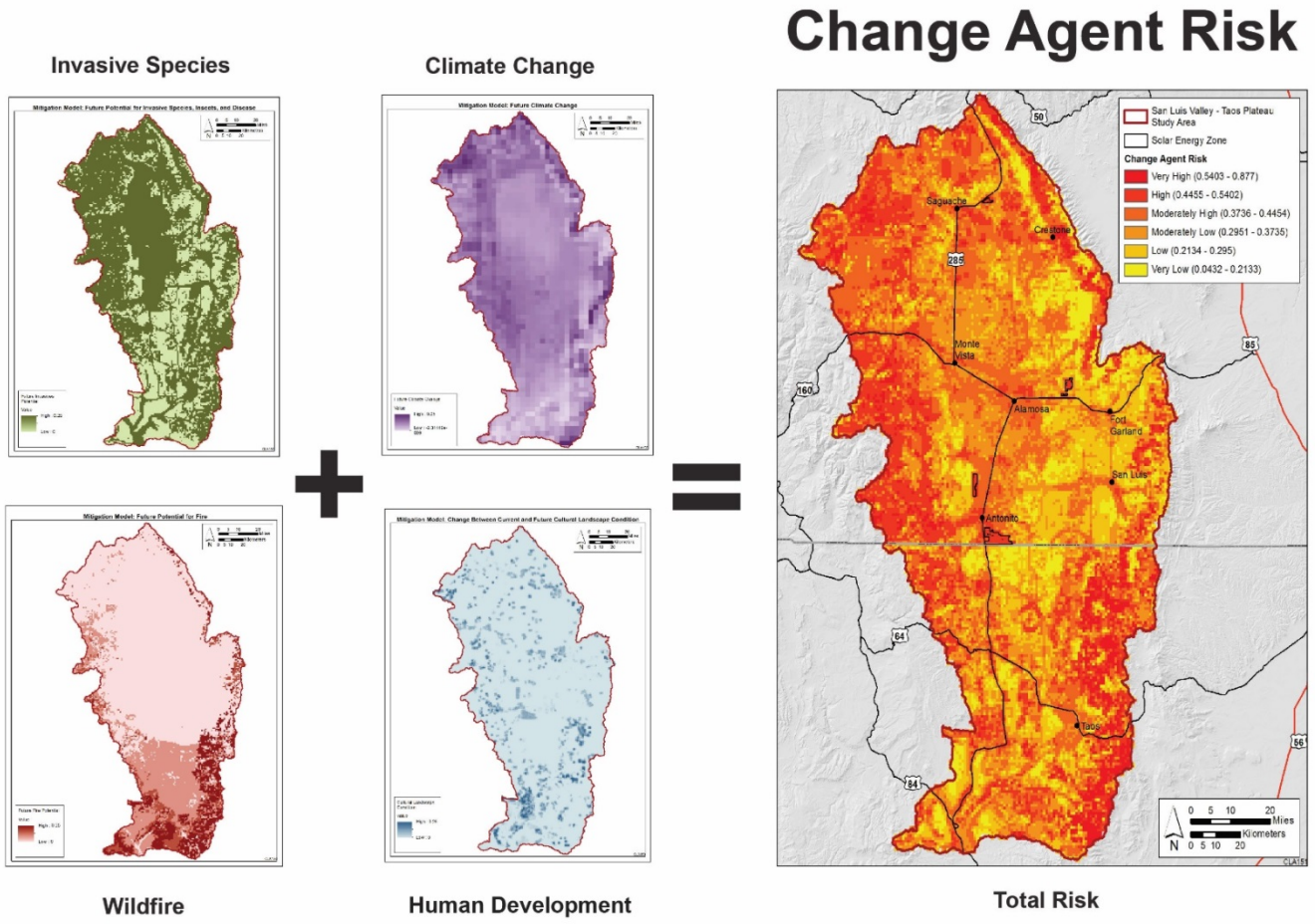


Figure 2-22. Calculation of Areas of Greatest Risk Resulting from Projected Future Conditions

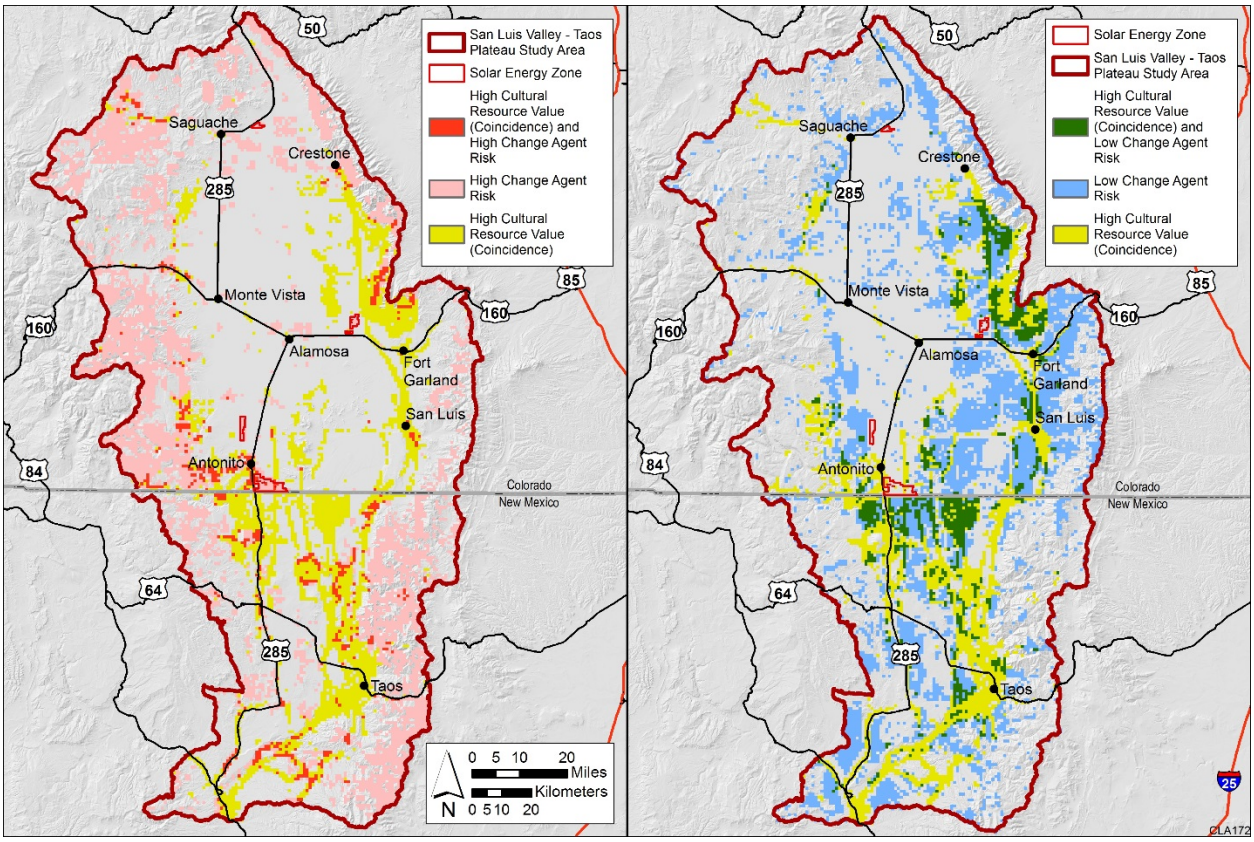


Figure 2-23. Areas of High Cultural Value and Risk from Future Trends of Change Agents

2.2 General Description of Solar Development in the Colorado Solar Energy Zones

2.2.1 Description of Existing Rights-of-Way, Development Status, and Recommended Non-Development Areas

2.2.1.1 Antonito Southeast SEZ

The Antonito Southeast SEZ is undeveloped and rural. Private lands north of the SEZ have been developed for irrigated agriculture. A farm/ranch headquarters abuts the site on the northwest corner. An operating perlite mill and an electric substation are also located near the northwest corner of the SEZ. Access to the SEZ is available from U.S. 285, which runs north-to-south along the west side of the SEZ. Remnants of a historic railroad, an irrigation reservoir, and a canal system are found in the SEZ. No existing transmission lines pass through the SEZ; however, the BLM has authorized Right of Ways (ROWs) for highway, telecommunications, and water facilities within the SEZ.

There are currently no applications for ROWs for solar facilities within the Antonito Southeast SEZ; however, there are two 1-2 MW solar photovoltaic (PV) facilities operating in the San Luis Valley on private land, within 40 mi (64 km) of the SEZ. There is ongoing interest in developing additional solar energy facilities on private lands in the San Luis Valley.

Since the signing of the Solar PEIS ROD, BLM has collected and/or compiled new BLM sensitive species survey data and analyses and reviewed other newly available information, and through this SRMS is recommending new non-development areas within the SEZ to avoid direct impacts to approximately 1,200 acres (4.9 km^2) of sensitive species and migratory habitat (i.e., for Gunnison's Prairie Dog, burrowing owl, swift fox, migratory birds, mountain plover, and pronghorn). If the BLM implemented these recommendations, then approximately 8,500 acres (34.4 km^2) of developable land would remain in the SEZ (Figure 2-24).

Figure 2-24 also indicates new recommended special resource consideration areas. Some are located around the non-development areas identified to avoid species impacts discussed in the paragraph above. Federal Emergency Management Agency floodplain areas have also been recommended as special resource consideration areas. During project-level NEPA, it is recommended that additional impact minimization measures (for example, minimizing activities during species-specific sensitive activity times) be considered for these areas. The actual extent of these areas would be determined during project-specific evaluation.

2.2.1.2 De Tilla Gulch SEZ

The De Tilla Gulch SEZ is rural and undeveloped, although county and informal roads, sand and gravel removal sites, transmission lines, and a windmill to provide livestock water are located within the SEZ. The northwest side of the SEZ is bordered by U.S. 285 and two county roads providing access to much of the rest of the area. The SEZ is bordered on the east and south by private lands, some of which have been developed for irrigated agriculture. Public land borders the northwest side of the area across U.S. 285. ROWs authorizing different uses have been granted by BLM on the public lands within the SEZ, including two power lines, U.S. 285, a county road, and a fiber optic line. Two 115-kV electric transmission lines cross the SEZ in a north–south direction and a locally designated transmission corridor covers much of the SEZ.

There are currently no active applications for ROWs for solar facilities within the De Tilla Gulch SEZ. There is ongoing interest in developing additional solar energy facilities on private lands in the San Luis Valley.

Since the signing of the Solar PEIS ROD, BLM has completed De Tilla Gulch SEZ 100-yr rainfall run-off modeling and floodplain and ephemeral drainage characterization, has collected and/or compiled new BLM sensitive species survey data and analyses, and has reviewed other newly available data. Based on these new data, BLM is recommending new non-development areas within the SEZ, adding approximately 40 acres (0.16 km^2) of sensitive species habitat (i.e., for Gunnison's Prairie Dog, burrowing owl, mountain plover, and pronghorn) and pronghorn movement areas. If the BLM implemented these recommendations, then approximately 1,000 acres (4.0 km^2) of developable land would remain in the SEZ (Figure 2-25).

Additionally, ephemeral drainage and 100-yr floodplain areas within the SEZ are recommended as new special resource consideration areas. During project-level NEPA, it is recommended that additional impact minimization measures be considered for these areas. The actual extent of these areas would be determined during project-specific evaluation.

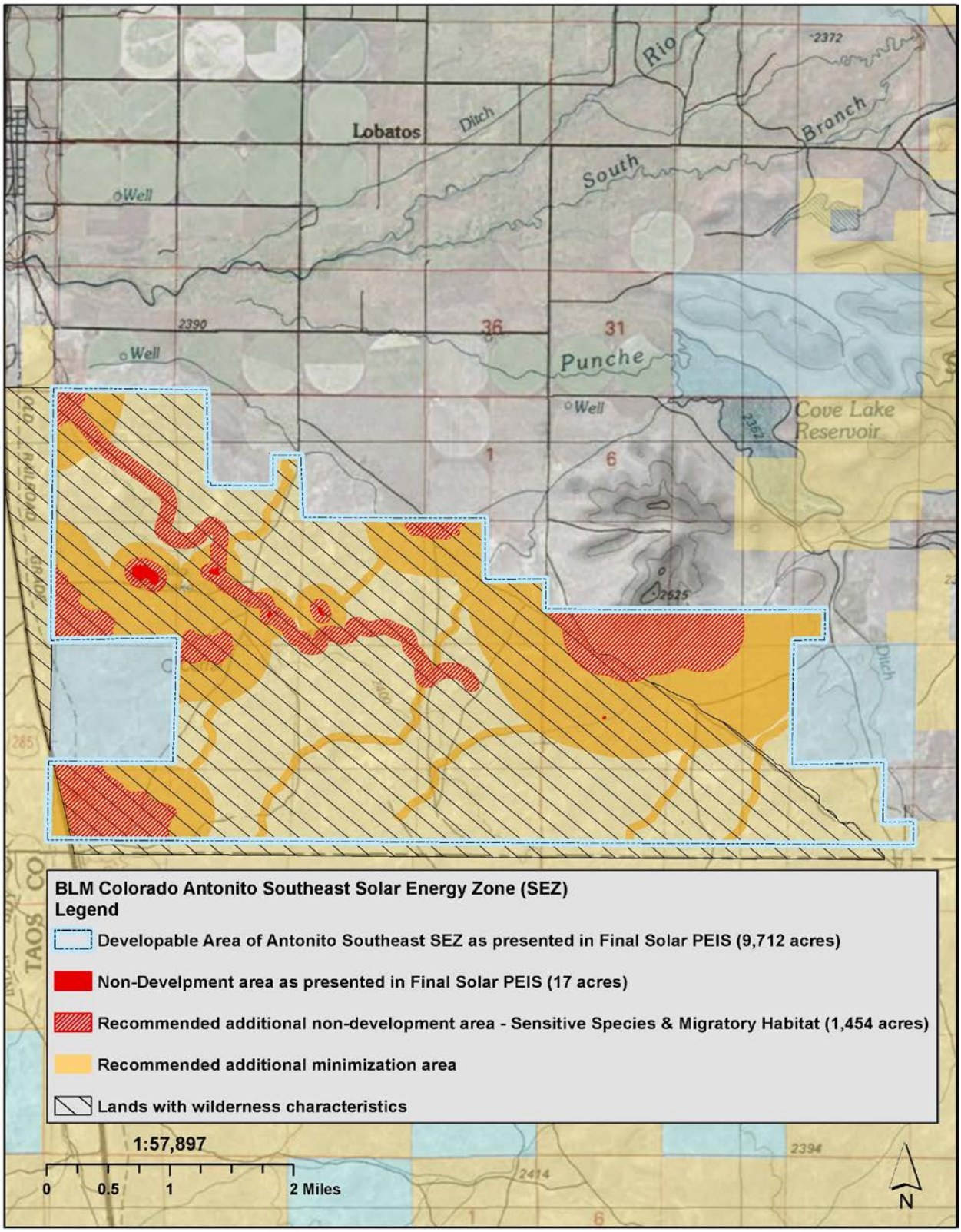


Figure 2-24. Antonito Southeast Solar Energy Zone Recommended New Non-Development Areas and Special Resource Consideration Areas

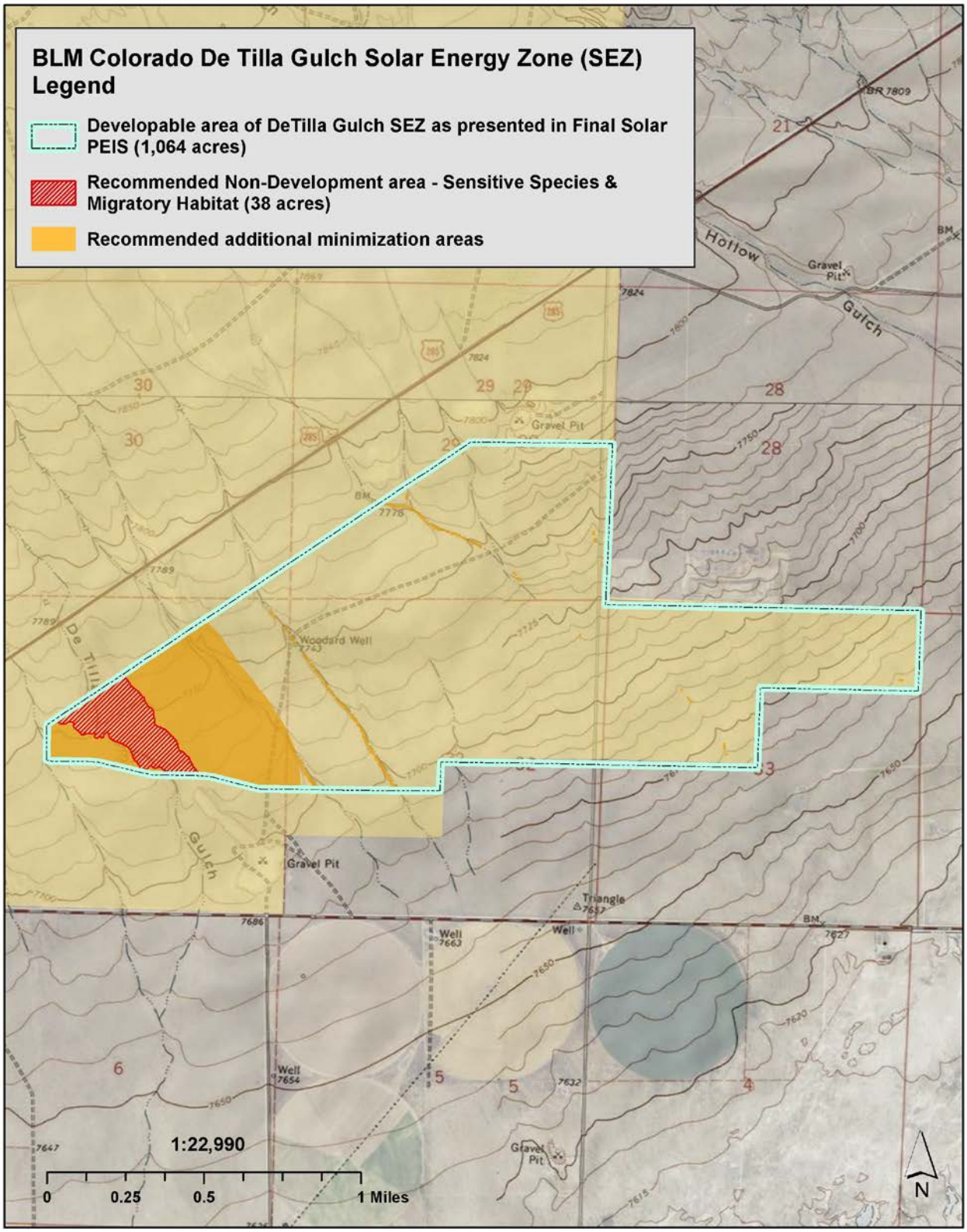


Figure 2-25. De Tilla Gulch Solar Energy Zone Recommended New Non-Development Areas and Special Resource Consideration Areas

2.2.1.3 Los Mogotes East SEZ

The Los Mogotes East SEZ is rural and undeveloped and is surrounded on the east by private lands that have been primarily developed for irrigated agriculture. Private lands adjacent to the SEZ on the east have been historically disturbed by long-term trash dumping. Home-sites are also scattered throughout area near the SEZ. Although the SEZ itself contains only BLM-administered lands, two parcels of state-owned land (1,100 acres [4.4 km^2]) border the SEZ on the north and south. Access to the west of the SEZ is available via three county roads from U.S. 285. A 69-kV transmission line terminates a short distance from the SEZ. There are no existing ROW authorizations within the SEZ. There are currently no solar development applications within the Los Mogotes East SEZ; however, there are five solar facilities operating in the San Luis Valley on private land. There is ongoing interest in developing additional solar energy facilities on private lands in the valley.

Since the signing of the Solar PEIS ROD, BLM has completed Los Mogotes East SEZ 100-yr rainfall run-off modeling and floodplain and ephemeral drainage characterization, has collected and/or compiled new BLM sensitive species survey data and analyses, and has reviewed other newly available data. Based on these new data, although no new non-development areas within the SEZ are recommended, the BLM is recommending approximately 45 acres (0.18 km^2) of 100-yr rainfall-run-off floodplain areas as new special resource consideration areas (Figure 2-26). During project-level NEPA, it is recommended that additional impact minimization measures be considered for these areas. The actual extent of these areas would be determined during project-specific evaluation.

2.2.2 Description of Potential Development

Utility-scale solar facilities of all technology types have a key element in common—they all have a large solar field with reflectors or photovoltaic surfaces designed to capture the sun's energy. The solar fields generally require a relatively flat land surface; only locations with less than 5% slope were included in the SEZs identified in the Solar PEIS ROD. In typical utility-scale solar facility construction to date, vegetation is generally cleared from solar fields prior to construction, and the fields are fenced to prevent damage to or from wildlife and trespassers.

In the Final Solar PEIS, maximum solar development of the SEZs was assumed to be 80% of the developable SEZ area over a period of 20 years, and data from various existing solar facilities were used to estimate that solar trough facilities will require about 5 acres/megawatt (0.02 km^2/megawatt), and other types of solar facilities (e.g., photovoltaic technologies) will require about 9 acres/megawatt (0.04 km^2/megawatt).

Antonito Southeast SEZ

The developable area of the Antonito Southeast SEZ as established in the Solar PEIS ROD is 9,712 acres (39.3 km^2). The BLM is recommending that the developable area of the SEZ be reduced by approximately an additional 1,200 acres, to avoid direct impacts to sensitive species and migratory habitat (see Section 2.2.1.1).

For the purposes of this assessment, it is assumed that additional non-development areas may be identified in the future based on field-level cultural resource and/or sensitive species survey, and that only about 6,800 acres (27.5 km^2) (80% of the recommended revised developable acreage) will actually

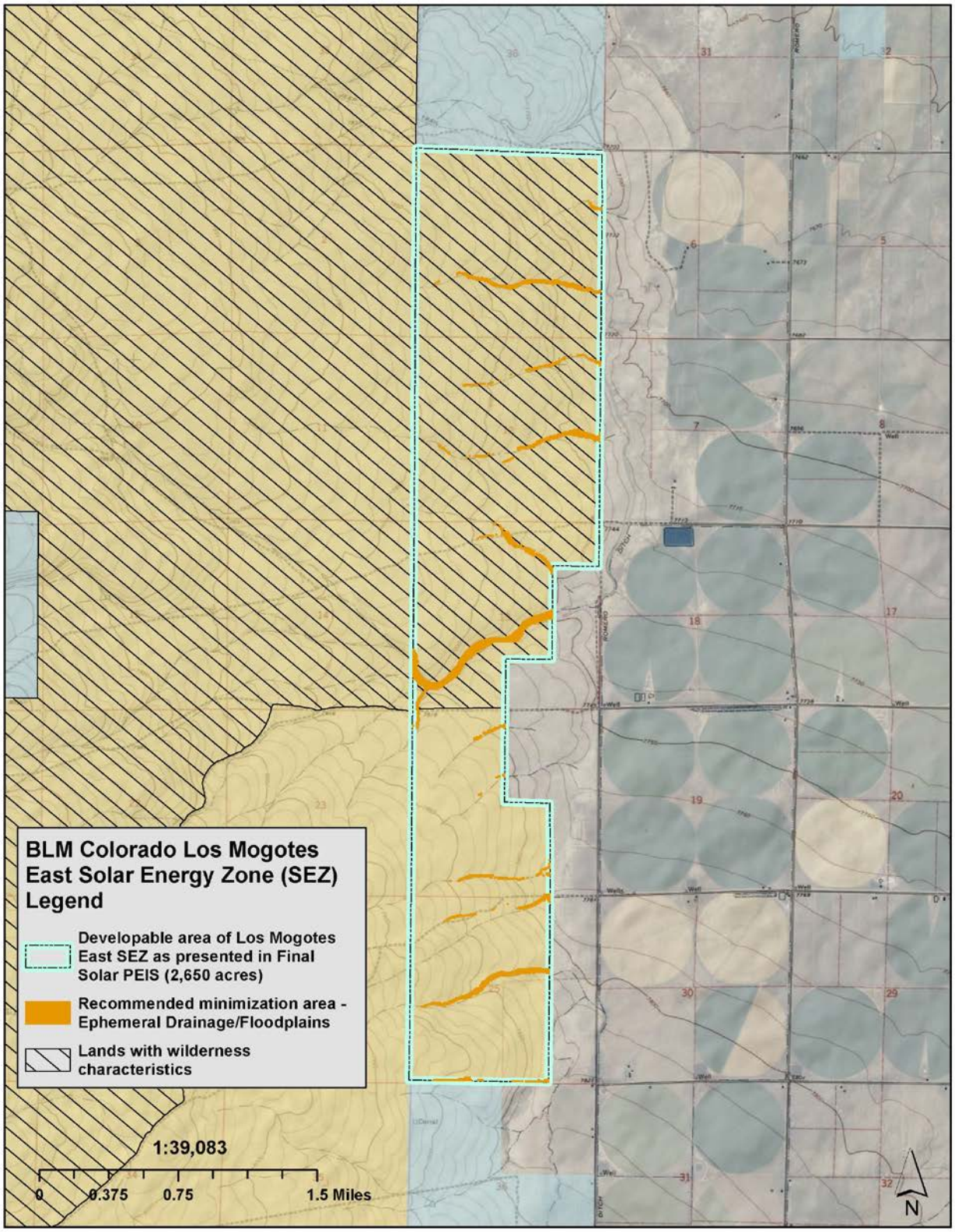


Figure 2-26. Los Mogotes Solar Energy Zone Recommended Special Resource Consideration Areas

be developed. Therefore, full development of the Antonito Southeast SEZ, assuming development of 80% of the revised developable area, would allow development of solar facilities with an estimated total of between 756 megawatts (for photovoltaic technologies) and 1,360 megawatts (for solar trough technologies) of electrical generating capacity.

Availability of transmission from SEZs to load centers is a key driver of future development in SEZs. For the Antonito Southeast SEZ, the Solar PEIS identified the nearest existing transmission line as a 69-kV line located about 10 mi (16 km) west of the SEZ. However, updated analysis shows that the nearest existing transmission line is a 69-kV line located 1.5 mi (2.4 km) north of the SEZ. A new transmission line could conceivably be constructed from the SEZ to the existing line, but the available capacity on the existing 69-kV would be inadequate for the new capacity required for the SEZ. Therefore, at full build-out capacity, new transmission and/or upgrades of existing transmission lines would likely be required to bring electricity from the Antonito Southeast SEZ to load centers. An assessment of the most likely load center destinations for power generated at the Antonito Southeast SEZ and a general assessment of the impacts of constructing and operating new transmission facilities on those load centers was provided in Section 8.1.23 of the Final Solar PEIS. Project-specific analyses would also be required to identify the specific impacts of new transmission construction and line upgrades and appropriate compensatory mitigation for that transmission for any projects proposed for development of the SEZ.

U.S. 285 runs along the western boundary of the SEZ and provides access to the SEZ; additionally, access to the eastern end of the SEZ is provided by Conejos County Road 18 and BLM Road 5025 (Alta Lake Road). Therefore, existing road access should be adequate to support construction and operation of solar facilities. It is likely that no additional road construction outside of the SEZ would be needed.

De Tilla Gulch SEZ

The developable area of the De Tilla Gulch SEZ as established in the Final Solar PEIS and ROD is 1,064 acres (4.3 km^2). It is recommended that the developable area of the SEZ be reduced to approximately 1,000 acres (4.0 km^2) (see Section 2.2.1.2). For the purposes of this assessment, it is assumed that more non-development areas may be identified in the future, and that only about 800 acres (3.2 km^2) (80% of the recommended revised developable acreage) will actually be developed. Using the land requirement assumptions described above, full development of the De Tilla Gulch SEZ, assuming development of 80% of the revised developable area, would allow development of solar facilities with an estimated total of between 89 megawatts (for photovoltaic technologies) and 160 megawatts (for solar trough technologies) of electrical generating capacity.

For the De Tilla Gulch SEZ, a 115-kV transmission line crosses through the SEZ and is under capacity upgrade planning by Xcel Energy. The existing line could conceivably be used to provide access from the SEZ to the transmission grid, but new transmission and/or upgrades of existing transmission lines may be required to bring electricity from the De Tilla Gulch SEZ to load centers. New private land solar projects in the general service area may limit future SEZ development. An assessment of the most likely load center destinations for power generated at the De Tilla Gulch SEZ and a general assessment of the impacts of constructing and operating new transmission facilities on those load centers was provided in Section 8.2.23 of the Final Solar PEIS. Project-specific analyses would also be required to identify the specific impacts of new transmission construction and line upgrades and appropriate compensatory mitigation for that transmission for any projects proposed for development of the SEZ.

U.S. 285 runs along the northwestern boundary of the SEZ, and Saguache County Roads AA and 55 run along the south and east sides of the SEZ, respectively. Therefore, existing road access should be adequate to support construction and operation of solar facilities. It is likely that no additional road construction outside of the SEZ would be needed.

Los Mogotes East SEZ

The developable area of the Los Mogotes East SEZ as established in the Final Solar PEIS ROD is 2,650 acres (10.7 km^2). No additional non-development areas are being recommended in this SRMS. However, for the purposes of this assessment, it is assumed that more non-development areas may be identified in the future, and that only about 2,120 acres (8.6 km^2) (80% of the developable acreage) will be developed. Using the land requirement assumptions described above, full development of the Los Mogotes East SEZ, assuming development of 80% of the developable area, would allow development of solar facilities with an estimated total of between 236 megawatts (for photovoltaic technologies) and 424 megawatts (for solar trough technologies) of electrical generating capacity.

For the Los Mogotes East SEZ, a 69-kV transmission line runs 3 mi (5 km) to the east of the SEZ. It is possible that a new transmission line could be constructed from the SEZ to the existing line, but the available capacity on the existing 69-kV would be inadequate for the new capacity required for the SEZ. Therefore, at full build-out capacity, new transmission and/or upgrades of existing transmission lines would likely be required to bring electricity from the Los Mogotes East SEZ to load centers. An assessment of the most likely load center destinations for power generated at the Los Mogotes East SEZ and a general assessment of the impacts of constructing and operating new transmission facilities on those load centers was provided in Section 8.3.23 of the Final Solar PEIS. Project-specific analyses would also be required to identify the specific impacts of new transmission construction and line upgrades and appropriate compensatory mitigation for that transmission for any projects proposed for development of the SEZ.

Since the nearest major road, U.S. 285 is not adjacent to the Los Mogotes East SEZ, the Solar PEIS analyses estimated that approximately an additional 47 acres (0.9 km^2) would be disturbed if a new 3-mi (5-km) access road to support solar energy development were constructed (BLM and DOE 2012). To minimize new disturbance, it is likely that an existing county road (e.g., Conejos County Roads N or P) would be improved to provide access to the SEZ for construction and operation of solar facilities.

2.3 Summary of Solar Development Impacts on the Colorado Solar Energy Zones

Programmatic-level but comprehensive assessment of the potential impacts of solar development at the Antonito Southeast SEZ, De Tilla Gulch SEZ and Los Mogotes East SEZ was provided in the Final Solar PEIS (BLM and DOE 2012). The Solar PEIS impact assessment was reviewed and updated by the BLM IDT during preparation of this SRMS. Results are summarized in Appendix A SEZ-specific tables. Potential adverse impacts included noise; degradation of air quality; impacts to vegetation, terrestrial wildlife, migratory birds, and special status species (both plants and animals); depletion and/or degradation of water resources; compaction and/or loss of soils; loss or degradation of cultural, paleontological, and visual resources; loss of grazing areas and associated socioeconomic impacts; visual impacts on nearby specially designated areas; impacts on lands with wilderness characteristics within and near to the SEZs, loss of recreational use of the SEZ lands; and damage to Native American resources of concern. Some potential beneficial impacts of development were

identified for local socioeconomics, as well as long-term beneficial impacts in terms of potential to reduce greenhouse gas emissions if solar energy produced at the SEZs would displace use of fossil fuels.

2.4 Mitigation Strategy (Hierarchy) for the Colorado Solar Energy Zones

2.4.1 Avoidance or Non-Development Areas

Antonito Southeast SEZ

As discussed in Section 2.1.1, 17 acres of non-development areas were identified for the Antonito Southeast SEZ in the Solar PEIS ROD to exclude wetland and lake areas (BLM and DOE 2012). The Solar PEIS ROD also identifies SEZ-specific design features that include some avoidance requirements. The SEZ-specific avoidance design features for the Antonito Southeast SEZ are listed below.

Wildlife (Birds): If present, prairie dog colonies (which could provide habitat or a food source for some raptor species) should be avoided to the extent practicable.

Disturbance near the elk and mule deer resident population areas should be avoided.

Development in the 253-acre (1-km^2) portion of the SEZ that overlaps the pronghorn summer concentration area should be avoided.

Paleontological Resources: Avoidance of PFYC Class 4 or 5 areas is recommended for development within the proposed Antonito Southeast SEZ (i.e., the 4-acre [0.016-km^2] parcel in the north part of the SEZ). Where avoidance of Class 4 or 5 deposits is not possible, a paleontological survey or monitoring would be required by the BLM.

In this SRMS, and based on new BLM sensitive species data not available for Final Solar PEIS analyses, the BLM recommends further application of the mitigation hierarchy onsite, through new SEZ-level non-development and special consideration areas to improve and better reflect conditions on the ground (See Figure 2-24). New non-development areas in the Antonito Southeast SEZ are recommended to avoid habitat for sensitive species including for active Gunnison's Prairie Dog colonies, burrowing owl nesting, Swift fox denning areas, and migratory bird playa habitat and water conveyance in the Taos Canal (see Section 2.2.1.1). This reduction in developable area of the SEZ will also reduce potential impacts identified in the Solar PEIS (e.g., fewer acres of habitat reduction will occur for sensitive species and other species as well).

De Tilla Gulch SEZ

As discussed in Section 2.1.1, the boundaries of the proposed De Tilla Gulch SEZ were revised in the Solar PEIS ROD to partially avoid impacts on an active Gunnison prairie dog colony, on pronghorn winter range and winter concentration area, and on the proposed Cochetopa Scenic Byway (BLM and DOI 2012). The Solar PEIS ROD also identifies the following SEZ-specific design feature that includes an avoidance requirement, as follows:

Wildlife (Birds): Prairie dog colonies (which could provide habitat or food resources for some bird species) should be avoided to the extent practicable.

In this SRMS, and based on new BLM sensitive species data not available for Final Solar PEIS analyses, the BLM recommends further application of the mitigation hierarchy onsite, through new SEZ-level non-development and special consideration areas to improve and better reflect conditions on the ground (See Figure 2-25). New non-development areas in the De Tilla Gulch SEZ are recommended to avoid habitat for sensitive species (see Section 2.2.1.1). This reduction in developable area of the SEZ will also reduce potential impacts identified in the Solar PEIS (e.g., fewer acres of habitat reduction will occur for sensitive species and other species as well).

Los Mogotes East SEZ

As discussed in Section 2.2.1.3, the boundaries of the proposed Los Mogotes East SEZ were revised in the Solar PEIS ROD to avoid or minimize impacts on significant cultural resources; grazing allotments; an important riparian area; Gunnison prairie dog, burrowing owl, ferruginous hawk, mountain plover, pronghorn birthing and winter habitat; and visual resources (BLM and DOE 2012). The Solar PEIS ROD also identifies SEZ-specific design features that include some avoidance requirements. The SEZ-specific avoidance design features for the Los Mogotes East SEZ are listed below.

Wildlife (Birds and Mammals): Prairie dog colonies should be avoided to the extent practicable to reduce impacts on species such as raptors, desert cottontail and thirteen-lined ground squirrel.

Paleontological Resources: Avoidance of PFYC Class 4/5 areas is recommended for development within the proposed Los Mogotes East SEZ and for access road placement. Where avoidance of Class 4/5 deposits is not possible, a paleontological survey would be required.

In this SRMS, and based on new BLM 100-yr rainfall runoff modeling not available for Final Solar PEIS analyses, the BLM recommends further application of the mitigation hierarchy onsite, through new special consideration areas to improve and better reflect conditions on the ground (see Figure 2-26). Consideration of additional minimization measures in these areas may reduce potential impacts identified in the Solar PEIS.

2.4.2 Minimization

2.4.2.1 SRMS Recommended Minimization Measures

Figures 2.11 through 2.13 portray additional BLM recommended special consideration areas within the three SEZs identified by the BLM IDT. BLM recommends that further evaluation and delineation of additional minimization measures for these areas should be included in project-specific NEPA.

BLM-recommended minimization measures for Colorado SEZs to be evaluated during project-level NEPA in addition to the implementation of the Programmatic Design Features (Appendix A) include:

- A-1: Evaluate construction timing restrictions in project-level NEPA alternatives to further minimize effects on wildlife (e.g., no construction during breeding season or in winter use concentration areas/critical winter range).

- SRMS AQ1: Explicitly compare design, construction and operation measures in range of NEPA alternatives to evaluate on-site dust generation avoidance effectiveness.

- SRMS AQ2: Evaluate a range of NEPA alternatives, varying maintenance and/or restoration requirements (range = 50-90% baseline cover) of native vegetation and soil cobble with other dust abatement methods.

- SRMS-AQ3: Evaluate solar panel mounting and other disturbance minimizing technologies in project-level NEPA alternatives (e.g. no grading of the site, retention of maximum native vegetation, use of low emission vehicles, placing gravel on roads, use of "drive and crush" installation).

- SRMS AQC2-2: Avoid construction during times of high dust emissions from other sources (e.g., agricultural plots).

- SRMS AQC2-3: The SEZ solar project Vegetation Management Plan will quantify site baseline protective soil cover and set project construction and operation-phase ground-level wind surface friction control targets beneath and surrounding solar arrays to reduce dust generation.

- SRMS AQC2-4: At reclamation, SEZs will be re-vegetated with native vegetation to increase soil stability as a plan of development feature to further minimize the amount of grading and surface disturbance and promote reduced dust emissions and PM levels.

- SRMS-CR2-2: For projects located within the viewshed of the West Fork of the North Branch of the Old Spanish Trail segment under study, further study is needed, which may include archival research, archaeological investigation, and viewshed analysis, to determine the area of possible adverse impact on resources, qualities, values, and associated settings of the Trail; to prevent substantial interference; and to determine any areas unsuitable for development.

- SRMS-CR2-3: Additional coordination with the CTSR Commission and the National Park Service is recommended to address possible mitigation measures for reducing visual impacts on the CTSR National Historic Landmark.

- SRMS ER2-2: A Vegetation Management Plan that includes the maintenance of the maximum acreage of native vegetation cover practicable, and compliance with applicable regulations and policies for the control of noxious weeds and invasive plant species (e.g., travel through weed-infested areas will be avoided; weeds will be treated, vehicles and machinery will be cleaned to remove weed seeds), to maintain ecological integrity and decrease the probability of wildfires.

- SRMS ER2-3: Evaluate solar panel mounting and other disturbance minimizing technologies (e.g., no grading of the site) in project-level NEPA alternatives.

- SRMS ER2-4: If project-specific impacts to groundwater are identified, purchase of existing water rights must be used to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table.

- SRMS ER2-5: Conduct surveying and treating invasive weeds, including henbane, along access roads to the SEZs.

- SRMS ER2-6: Consider the applicability of guidelines developed by the Avian Power Line Interaction Council.

- SRMS ER2-7: Evaluate implementation of technologies that minimize the amount of reflective surfaces, or alter how the surfaces are perceived by wildlife, that will reduce the "lake effect" in attracting migratory birds and other wildlife.

- SRMS ER2-8: Evaluate construction timing restrictions in project-level NEPA alternatives to further reduce impacts. Timing limitation should be enforced from May 15-July 15 for any surface disturbing activities to protect migratory bird nesting and brood rearing,

- SRMS ER2-9: Conduct Raptor nest surveys within a 0.5-mile radius of the project site. If any raptor nests are located, appropriate timing limitations should be applied.

- SRMS ER2-10: Conduct Migratory bird monitoring.
- SRMS S1-2: Onsite mitigation could include requiring developers to secure agreements for local government services as a condition of "Notice to Proceed."

- SRMS WR1: Project-level NEPA alternatives should evaluate maintenance of existing flow patterns at the site boundary, by avoiding ephemeral drainages and/or providing detention and/or retention facilities. To avoid any impact to downstream properties. Detention can be provided on the SEZ to capture the volume of flow that is represented by the increase between existing and proposed conditions. Retention could be utilized to capture all the additional flow volume with little to no overland surface water release.

- SRMS WR2-2: The Vegetation Management Plan should include the maintenance of the maximum acreage of native vegetation cover practicable during construction and operation, and minimization of land disturbance in ephemeral washes and dry lakebeds.

- SRMS WR2-3: If project-specific impacts to groundwater are identified, purchase of existing water rights must be evaluated to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table.

2.4.2.2 Programmatic and SEZ-Specific Design Features to be Applied

The Solar PEIS ROD identified a comprehensive suite of required programmatic design features that would avoid and/or minimize adverse impacts to resources, either onsite or through consultation/coordination with potentially affected entities. The programmatic design features are extensive and are listed in their entirety in Appendix A of the Solar PEIS ROD (BLM 2012a). These

programmatic design features include required actions to avoid or minimize impacts to all of the potentially impacted resources listed in Section 2.3.

The Solar PEIS ROD also includes SEZ-specific design features for the SEZs. Many of these SEZ-specific design features will be accomplished if the new non-development areas and avoidance/ minimization measures recommended by the BLM IDT (see Section 2.4.2.3) are implemented either through the selection of grant parcels or at the project-specific level. Appendix A includes in table format all SEZ-specific design features by resource.

2.4.3 Regional Compensatory Mitigation

As presented in this SRMS, BLM identified, quantified, and qualitatively evaluated the impacts of utility-scale solar development that may warrant regional compensatory mitigation based on three steps: 1) identifying the direct, indirect, and cumulative impacts (Sources: Draft, Supplement, and Final Solar PEIS; 2) review of baseline studies, data and documents (see Appendix D) identifying which of the potential impacts are likely to remain as residual impacts (i.e., that cannot be avoided or minimized onsite); and 3) identifying which of the residual impacts are of a degree or magnitude that may warrant regional compensatory mitigation. BLM evaluates degree of impacts by taking into consideration the condition and trend of the impacted resources in the ecological sub-region and landscape in the context of existing policy and law regarding those resources and how that condition and trend could be affected by the residual impacts.

As part of the SRMS process, a BLM IDT re-evaluated the potential impacts of solar development that were described in the Final Solar PEIS (see Section 2.3) in the light of more recent available data specific to each SEZ area. The BLM IDT followed the methodology presented in Sections 2.4.3.1 and 2.4.3.2 for first identifying residual impacts from solar development in the SEZ, and then for identifying the degree or magnitude of residual impacts in the context of the San Luis Valley and Taos Plateau landscape, in order to identify those residual impacts that may warrant regional compensatory mitigation. The identification of residual impacts and residual impacts that may warrant regional compensatory mitigation was presented to the public during the period 2014-2015 and their input was incorporated into this draft SRMS.

2.4.3.1 Identification of Residual Impacts

The BLM followed the methodology below to identify residual impacts:

a. BLM verified and/or augmented the affected environment and impacts presented in the Draft, Supplemental, and Final Solar PEIS, including the direct, indirect, and cumulative impacts for each resource (Appendix A, Impact Assessment Summary Tables).

b. BLM evaluated whether the description of the affected environment and impacts was comprehensive and accurate and augmented where new or more detailed information was available that could influence the description of impacts as provided in the Final Solar PEIS.

c. BLM reviewed the programmatic and SEZ-specific design features (i.e. avoidance and minimization measures) presented in the Solar PEIS ROD, and recommended if there were additional measures that could be implemented to avoid and/or minimize impacts. Where

applicable, these additional mitigation measures were documented as requiring evaluation in project-specific NEPA (Appendix A, Impact Assessment Summary Tables).

d. BLM identified the impacts that could be mitigated through additional avoidance and/or minimization, including the required design features described previously.

e. The residual impacts (i.e., those that would remain after implementation of required design features) were identified.

BLM summary tables presented in Appendix A document the agency basis for the identification of residual (unavoidable) impacts for the Colorado SEZs.

2.4.3.2 Residual Impacts that May Warrant Regional Compensatory Mitigation

2.4.3.2.1 Conceptual Models

A conceptual model or models depicting interrelationships between key ecosystem components, processes, and stressors at the Colorado SEZs is needed to evaluate the effectiveness of compensatory mitigation investments employed through an SRMS. The SRMS project team constructed conceptual models to explain the role that resources, individually and in concert with one another, play in the function of the relevant ecological, social, and cultural systems present in the region. This regional models provided the context to identify critical resources at the local scale. Information sources used for the development of the conceptual models included:

- BLM RMPs
- Resource specialist expert opinion
- Habitat conservation plans

Additional resources (e.g., other baseline resource surveys, inventories, occurrence records, studies/research, assessments, and plans providing insight into regional conditions and trends; ethnographic studies; county or regional land use plans; and federal, state, or local social and economic studies) could be used to refine the models in the future.

Five conceptual models were developed for the Colorado SEZ SRMS. These models were developed with a goal of describing in detail the processes essential to sustain the ecosystem and the stressors that influence those processes. The first tier of the conceptual model displays the San Luis Valley/Taos Plateau ecosystem interactions at an ecoregional scale. Tier 2 displays solar energy development in relation to BLM managed activities and resources, values, and functions. The most detailed models, Tier 3, display solar energy development at each of the Colorado SEZs, Antonito Southeast, De Tilla Gulch, Los Mogotes East, identifying those resources that are anticipated to have residual impacts and those that may warrant regional compensatory mitigation. All of these conceptual models are presented in Appendix B.

2.4.3.2.2 Summary of Residual Impacts that May Warrant Regional Compensatory Mitigation

Based on the best available information (See Appendices A, C, and D), conceptual models (Appendix B), assessments, expert opinion, and the EPA Environmental Justice Screening Tool, the BLM identified those residual impacts that may warrant compensatory mitigation in the context of existing

policy and laws and current resource management plans' goals and objectives regarding those resources. BLM estimated where and how the residual impacts of solar development could affect the condition and trend of the at-risk resource values at both local and landscape scales.

The following criteria/were also considered in determining if compensatory mitigation may be warranted:

a. The relative importance placed on the resource in the land use plan.

b. The rarity, legal status, or state or national policy status of the resource.

c. The resilience of the resource in the face of change and impact.

The BLM applied the criteria to the assumed full build-out of the SEZs to identify which residual impacts, in the context of the regional setting, may warrant regional compensatory mitigation for the Colorado SEZs. This list has been reviewed by stakeholders and their comments have been considered. Based upon the criteria, BLM identified the Basin Grassland and Shrubland community and associated conservation elements including pronghorn, a grassland faunal assemblage of BLM sensitive species, soils, air quality, and hydrology as at particular risk from the extent of SEZ full build out and on the basis of the regional trend analysis outlined in Section 2.1.6.2. BLM also identified the following residual impacts that may warrant regional compensatory mitigation for the Colorado SEZs, as follows:

Antonito Southeast SEZ

- The loss and/or degradation of Basin Shrubland and Grassland ecosystem services and the human uses depending on them, as a result of development and until the lease expires and the site is restored. The primary components of the ecological system and services potentially lost or degraded are: soils, basin shrubland-grassland vegetation communities, water, air quality, terrestrial wildlife, migratory birds, and viewsheds.

- The loss of pronghorn habitat, big game winter range, wildlife movement corridors; loss of habitat and potentially of populations of the following BLM sensitive plant and animal species: Ripley's milkvetch, rock-loving aletes, Gunnison's prairie dog, burrowing owl, swift fox, ferruginous hawk, Brewer's sparrow, mountain plover, and Northern leopard frog; loss of habitat for the ESA-listed species southwestern willow flycatcher; loss of habitat for migratory birds.

- Residual environmental justice impacts to low-income and minority populations in the town of Antonito may include potential for SEZ air quality degradation and fugitive dust impact risk to public health; noise; reduced water quality and availability for agricultural and ranching water users; the visual impacts of solar energy facilities; negative effects on heritage livestock grazing; restricted access to land used for economic, recreation, sustenance hunting, or cultural/religious purposes; and effects on property values.

- Residual impacts to visual resources within the SEZ, and viewsheds at nearby communities and at the following visually sensitive areas: Cumbres and Toltec Scenic Railroad; Rio Grande del Norte National Monument; U.S. Highway 285, "Welcome to Colorful Colorado" sign at NM-CO state line; and the West Fork of the North Branch of the Old Spanish Trail segment under study (based on new analyses in Sullivan et al. 2016).

De Tilla Gulch SEZ

- The loss of land/or degradation of Basin Shrubland and Grassland ecosystem services and the human uses that depend on them, as a result of development and until the authorization expires and the site is restored. The primary components of the ecological system and services potentially lost or degraded are: soils, basin shrubland-grassland vegetation communities, water, air quality, terrestrial wildlife, migratory birds, and viewsheds.

- The loss of pronghorn habitat, big game winter range, wildlife movement corridors, and habitat and potentially populations of the following BLM sensitive animal species: big free-tailed and Mexican free-tailed bats, Gunnison's prairie dog, western burrowing owl, swift fox, ferruginous hawk, Brewer's sparrow, mountain plover, and Northern leopard frog.

- Residual environmental justice impacts to low-income and minority populations in the town of Saguache may include potential for SEZ air quality degradation and fugitive dust impact risk to public health; noise; reduced water quality and availability for agricultural and ranching water users; the visual impacts of solar energy facilities; negative effects on heritage livestock grazing; restricted access to land used for economic, recreation, sustenance hunting, or cultural/religious purposes; and effects on property values.

- Residual impacts to visual resources within the SEZ, and viewsheds at nearby communities and at the following visually sensitive areas: community of Moffat; the Old Spanish National Historic Trail, and U.S. Highway 285 (based on new analyses in Sullivan et al. 2016).

Los Mogotes East SEZ

- The loss and/or degradation of Basin Shrubland and Grassland ecosystem services and the human uses that depend on them, as a result of development and until the authorization expires and the site is restored. The primary components of the ecological system and services potentially lost or degraded are: soils, basin shrubland-grassland vegetation communities, water, air quality, terrestrial wildlife, migratory birds, and viewsheds.

- The loss of pronghorn habitat, big game winter range, wildlife movement corridors, and habitat and potentially populations of the following BLM sensitive plant and animal species: Ripley's milkvetch, rock-loving aletes, Gunnison's prairie dog, western burrowing owl, swift fox, ferruginous hawk, Brewer's sparrow, mountain plover, and Northern leopard frog.

- Residual environmental justice impacts to low-income and minority populations in the communities of La Jara, Capulin, Romeo, and Manassa may include potential for SEZ air quality degradation and fugitive dust impact risk to public health; noise; reduced water quality and availability for agricultural and ranching water users; the visual impacts of solar energy facilities; negative effects on heritage livestock grazing; restricted access to land used for economic, recreation, sustenance hunting, or cultural/religious purposes; and effects on property values.

- Residual impacts to visual resources within the SE, and viewsheds at nearby communities and at the following visually sensitive areas: the community of Romeo and the Veteran's

Memorial; U.S. Highway 285, and the West Fork of the North Branch of the Old Spanish Trail segment under study (based on new analyses in Sullivan et al. 2016).

In addition, for all three SEZs BLM identified the following residual impacts as having the potential to warrant mitigation, depending on the way the area is developed, the success of onsite avoidance and minimization, the results of investigations to fill data gaps, and/or the discovery of unanticipated resources:

- Acoustic impacts associated with loss of vegetation-habitat for terrestrial wildlife, sensitive species, raptors, and migratory birds,
- Air quality impacts as detailed in the Solar PEIS and a dust modeling study (Chang et al. 2016),
- Impacts on cultural resources based on the Cultural Heritage Values and Risk Assessment analyses (Wescott et al. 2016) and coordination with stakeholders (consultation with the appropriate SHPO(s) and tribes is required during project-specific NEPA and would help BLM to determine if residual impacts are expected to occur and if compensatory mitigation would be required),
- Impacts from invasive and noxious weeds,
- Certain Native American concerns (e.g., loss of habitat and cultural values),
- Socioeconomics impacts, including impacts on population, housing and community services; economic impacts on livestock grazing and recreation; and social impacts from solar energy development.
- Impacts to lands with wilderness characteristics in and near the Antonito Southeast and Los Mogotes SEZs.

While no regional compensatory mitigation outcomes are proposed for these potential impacts through this SRMS, they will be the focus of an elevated level of monitoring so as to facilitate the timely detection of unanticipated impacts and conditional stipulations to be included in the lease to afford prompt and effective remediation.

2.5 Regional Goals and Mitigation Desired Outcomes

In this SRMS, BLM recommends eight regional or landscape-scale mitigation goals, as well as a range of possible landscape objectives and mitigation outcomes and actions, as regional mitigation options to compensate for residual impacts warranting compensatory mitigation (Section 2.4.3.2.2). The landscape goals and objectives provide an overarching vision for compensatory mitigation, while the mitigation outcomes and actions are designed to offset the residual adverse impacts that warrant mitigation with compensatory mitigation actions that improve or protect resource elsewhere in the region.

BLM regional goals and objectives were developed with stakeholder engagement in 2015 and are drafted in conformance with the San Luis Valley and Taos RMPs (BLM 1991 and BLM 2012b). In developing the SRMS, the BLM also reviewed the Comprehensive Wildlife Conservation Strategy for New Mexico (NM Department of Game and Fish 2006), the Colorado State Wildlife Action Plan (CO Division of Wildlife 2006), and the Great Sand Dunes National Park General Management Plan (NPS 2007) to establish management goals and guidance related to the residual impacts identified in Section 2.4.3.2.2 for the Colorado SEZs. During project-specific NEPA analysis, more detailed analysis of impacts and identification of mitigation outcomes and actions would be identified, if appropriate. (For example,

specific impacts and mitigation actions could be evaluated). The RMP guidance regarding regional goals and objectives is identified in the first column of Table 2-10.

Mitigation desired outcomes and potential mitigation actions, as presented in columns 3 and 4 of Table 2-10, were developed with respect to multiple scales of focus, achievability, relevance to impacts, and timelines. They are high-level desired outcomes and actions to be considered in project-specific NEPA for selecting compensatory mitigation sites and actions within the region. BLM evaluates and compares potential mitigation sites and actions for the Colorado SEZs in Section 2.8.

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 1: Achieve conservation gain in upland vegetation, riparian and wetland communities, necessary habitat components and life history requirements at landscape-scale to support functioning ecological processes, landscape resiliency and integrity, and sustain viable and resilient populations of migratory birds, special status species, and other native wildlife. *SEZ Residual Impacts Addressed*: Soil, Water/Hydrology, Ecology: Terrestrial Habitat, Special Status Species, Big game species, Migratory Birds, Playa wetlands, Environmental Justice, Socioeconomics	Objective 1.1 Preserve, conserve or acquire functional acreage of target terrestrial ecosystems at appropriate mitigation ratios based on condition and context in the San Luis Valley-Taos Plateau landscape.	Site Outcome 1.1.a Within 5-10 years of project initiation, replace equivalent target grassland-shrubland habitat acreage, condition, and biological function lost to SEZ development, and verify mitigation through use of Assessment, Inventory, Monitoring (AIM[13]) terrestrial core indicator data, as well as data on the presence/absence of terrestrial wildlife and sensitive species.	Site Action 1.1.a.1. Expand existing or designate new ACECs, define compatible uses or additional protections in land use planning.[14] Action 1.1.a.2 Negotiate and acquire non-federal parcels from willing landowners. Action 1.1.a.3. Negotiate establishment of private lands conservation easements. Action 1.1.a.4. Establish seasonal closures where necessary to protect important wildlife habitat (e.g., pronghorn lambing, etc.).	*Antonito Southeast (SE) SEZ* BLM: Rio Grande Corridor; Taos Plateau Pronghorn Assemblage Brownie Hills, Cumbres Toltec, Taos Plateau Big Game Migration; Limekiln- Greenie Stakeholder: Mogote-Conejos; Rio Grande Corridor; Cumbres Toltec (CPW); Rio Grande (TWS); Illegal Dump sites (CCCW) Rio Grande Corridor (SLVEC); Antonito SE Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW)

[11] Landscape goals and objectives are presented as a framework for identifying recommendations for mitigation desired outcomes, potential mitigation actions, and potential mitigation sites; these recommendations may be evaluated in project-level NEPA alternatives for the three SEZs evaluated.

[12] See Figure 2-29: BLM and Stakeholder Recommended Regional Compensatory Mitigation Sites.

[13] BLM Technical Note 445 – AIM-Monitoring: A Component of the BLM Assessment, Inventory, and Monitoring Strategy; Taylor et.al. April 2014.

[14] Preservation through new land use planning and designations is acknowledged as an important mitigation action, but related costs are not included in the recommended fee presented in Section 2-6. BLM land use planning costs are assumed to be internal to BLM operations.

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 1 (continued): *BLM RMP Conformance -Guidance:* SLV RMP (1991), Taos RMP (2012); Rio Grande NF Plan (1996), Great Sand Dunes NP GMP (2007)	Objective 1.2 Restore or enhance functional acreage of target terrestrial ecosystem condition and functionality at appropriate mitigation ratios, based on condition and context within the San Luis Valley-Taos Plateau landscape	Outcome 1.2.a Restore or enhance equivalent target grassland-shrubland functional habitat acreage, condition, and biological function lost to SEZ development, toward desired ecological state by a 25-50% vegetation cover "uplift" within 10-15 years of project initiation, including shrub composition and distribution, successional stage, and/or eradication of invasive species. Verify through use of AIM terrestrial core indicator data as well as data on the presence/absence of terrestrial wildlife and sensitive species.	Action 1.2.a.1 Adjust or modify livestock grazing (including grazing season of use, livestock class, and intensity of use on BLM allotments to prevent possible future overgrazing and increase desirable plant species, to provide offsite habitat uplift. Action 1.2.a.2. Apply BLM "Seeds of Success" including local native seed collection, site preparation, native plant restoration, and effectiveness monitoring activities. Action 1.2.a.3. Treat invasive plant species, noxious weeds or other undesirable species. Action 1.2.a.4. Vaccinate and dust Gunnison's Prairie dog colonies by providing support/funding to DPW to accomplish action.	*De Tilla Gulch SEZ* BLM: Poncha Pass; Trickle Mountain-Saguache Creek; Fourmile Traditional Cultural Landscape; Closed Basin Wetlands; Sangres Foothills; Tracey-Biedell; OSNHT Stakeholder: Poncha Pass, Trickle Mountain-Saguache Creek, Tracey Biedell (CPW); Poncha Pass, closed Basin (SLVEC); De Tilla Gulch Areas 1-5 (TNC); Mineral Hot Springs; Findley Gulch, Elephant Rocks (DoW); TWS

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 1 (continued):			Action 1.2.a.5. Install range improvements (i.e., stock tanks; spring enhancement, etc.) to utilize under-utilized range, reducing grazing pressure in other areas. Action 1.2.a.6. Remove unnecessary fence and install wildlife friendly fence where fences are necessary. Action 1.2.a.7. Install offsite avian deflectors on transmission lines/create wildlife/avian friendly transmission mitigation fund. Action 1.2.a.8. Augment mitigation monitoring capabilities to reduce unauthorized uses and associated resource impacts. Action 1.2.a.9. Purchase state or private habitat exchange credit	*Los Mogotes East SEZ* BLM: Mogote-Conejos; Rio Grande Corridor; Brownie Hills; Cumbres Toltec; Taos Plateau Pronghorn Assemblage; Taos Plateau Big Game Migration; Limekiln- Greenie Stakeholder: Mogote-Conejos; Rio Grande Corridor, Cumbres Toltec (CPW); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); Los Mogotes Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW)

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 1 (continued):			Action 1.2.a.10. Perform high density shrubland treatments including controlled burning, firebreak creation, spot treatment, transplanting mechanical, herbicide and reseeding efforts. Action 1.2.a.11. Construct wildlife water enhancements or spring developments. Action 1.2.a.12. Close and rehabilitate unnecessary or unauthorized routes by ripping/seeding and installing erosion control structures (to reduce habitat fragmentation). Action 1.2.a.13. Restore shrubland and grassland habitats to benefit pollinators.	

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 1 (continued):	Objective 1.3 Preserve, conserve or acquire, and maintain wet meadow, emergent and riparian habitat to attract migratory birds and avian populations in the San Luis Valley and Taos Plateau landscape.	Outcome 1.3.a Protect migratory bird playa, wet meadow, emergent wetland or riparian habitat acreage, condition, and biological function lost to SEZ development through BLM ACEC designations or Conservation Easements, at appropriate mitigation ratios, based on condition and context within the San Luis Valley-Taos Plateau landscape~~, w~~ithin 5-10 years of project initiation.	Action 1.3.a.1. See 1.a.1.-1.a.3.	
	Objective 1.4. Restore or enhance playa, wet meadow, emergent and riparian habitats to attract migratory birds and avian populations in the San Luis Valley and Taos Plateau landscape.	Outcome 1.4.a. Rectify, restore or enhance migratory bird playa, wet meadow, emergent wetland or riparian habitat acreage, condition, and biological function lost to SEZ development, at appropriate mitigation ratios, within 2-5 years of project initiation.	Action 1.4.a.1. Purchase or acquire augmentation water as off-site migratory bird habitat. Action 1.4.a.2. Re-drill Blanca Wetlands/McIntire-Simpson wells to produce adjudicated flows to create more wetlands as off-site migratory bird habitat. Action 1.4.a.3. Construct infrastructure improvements (i.e. ditches, dikes, headgates, etc.), to maximize wetlands habitats by maximizing existing water rights/ water use efficiencies as offsite migratory bird habitat.	

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 2: Historically important cultural resources are identified, preserved, and protected, to ensure availability and appropriate uses by present and future generations. *SEZ Residual Impacts Addressed*: Cultural Resources, Specially Designated Areas: Rio Grande del Norte NM; Old Spanish NHT, Cumbres Toltec NHL, Environmental Justice, Socioeconomics *Guidance:* SLV RMP (1991), Taos RMP (2012); Rio Grande NF Plan (1996), Great Sand Dunes NP GMP (2007)	Objective 2.1: Conduct NHT and other cultural heritage regional research to identify and document location, condition, context of historic properties and cultural landscapes in the San Luis Valley-Taos Plateau region based on site, type, and characteristics including National Register criteria. Objective 2.2: Protect, enhance, and/or interpret NHT and other cultural resources in the San Luis Valley–Taos Plateau landscape for communities affected by public land solar energy development and to avoid adverse effects to traditional cultural properties.	Site Outcome 2.1.a Compensate equivalent target cultural landscape acreage, condition, and historic preservation function impacted directly, indirectly and cumulatively by SEZ development through knowledge gained by research within 1-5-years of project initiation. Outcome 2.2.a Avoid, reduce, and/or mitigate imminent threats and potential conflicts from natural or human-caused deterioration within 1-2 year of project initiation Outcome 2.2.b Protect and interpret known cultural resource value and ecologically sensitive areas (such as traditional procurement activity areas), through acquisition or easements as measured by area protected, public or interpretation visits, or public reached within 1-5 years of project initiation.	Site Action 2.1.a.1 1) National historic trail routes and historic settings, trail remnants, and artifacts are researched, identified, protected, and interpreted through a system of permanent displays for public use and enjoyment. 1) Study and archive research for West Fork of the Old Spanish Trail Segment under study; 2) Create permanent display in new visitor center in the Town of Saguache. Action 2.2.a.1 Partner restore SHPO & NHA identified historic buildings in Conejos County Antonito et al. Action 2.2.b.1 Establish cultural and ecological setting and land use mitigation banks (i.e. pinon collection). Negotiate and acquire non-federal parcels of the OSNHT from willing landowners under the provisions of the NTSA.	*Antonito SE SEZ* BLM: Hispano Cultural Landscapes; Rio Grande Corridor; Taos Plateau Pronghorn Assemblage; Brownie Hills; Cumbres Toltec NHL; Taos Plateau Big Game Migration; Limekiln- Greenie; West Fork of the North Branch of the OST Segment Under Study Stakeholder: Mogote-Conejos, Rio Grande Corridor; Cumbres Toltec NHL (CPW); Rio Grande (TWS); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); Antonito SE Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW, OSTA) *De Tilla Gulch SEZ* BLM: Hispano Cultural Landscapes; OSNHT; Fourmile Traditional Cultural Landscape; Closed Basin Wetlands; Sangres Foothills; Trickle Mountain-Saguache Creek; Tracey-Biedell

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 2 (continued):	Objective 2.3. Enhance cultural heritage education & Sangre de Cristo & Northern Rio Grande NHA values by increasing regional & national knowledge of the Spanish & Mexican land grant and Hispano settlement patterns in the San Luis Valley and Taos Plateau landscape.[15] Map and document land grant era	Outcome 2.3.a. Expand public knowledge of NHA cultural features through regional research, publication, and presentations of Hispano acequia-long lot systems as measured by student-public involvement, areas surveyed, visitation and public outreached from baseline within 1-5 years of projection initiation	Action 2.2.b.2 Enhance visitor experience through development of educational and interpretative services, such as trails, signage, kiosks, and literature (for example, for cultural heritage landscapes like the OSNHT). Action 2.3.a.1 Map and document Spanish & Mexican era land grant acequia-long lot agricultural-hispano settlement heritage areas in Sangre de Cristo & Northern Rio Grande NHAs. For example, prepare a historic context (Class I report) or, if warranted, National Register Multiple Properties Documentation Forms. Address relationship of OSNHT network to aboriginal settlement/economy before and during period of significance of the OSNHT and succeeding settlement during Spanish Colonial, Mexican Territorial and 19th Century US settlement.	Stakeholder: Trickle Mountain-Saguache Creek, Tracey Biedell (CPW); Closed Basin (SLVEC); De Tilla Gulch Areas 1-5 (TNC); Mineral Hot Springs; Findley Gulch (TWS); Elephant Rocks (DoW, OSTA) *Los Mogotes East SEZ* BLM: Hispano Cultural Landscapes; Mogote-Conejos; Rio Grande Corridor; Brownie Hills; Cumbres Toltec; Taos Plateau Pronghorn Assemblage; Taos Plateau Big Game Migration; Limekiln- Greenie, West Fork of the North Branch of the OST Segment Under Study Stakeholder: Mogote-Conejos, Rio Grande Corridor; Cumbres Toltec NHL (CPW); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); Los Mogotes Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW, OSTA)

[15] The OSNHT and its viewshed, in addition to the acequia systems and other components of Hispano settlement and land use patterns, are part of the Hispano cultural landscape.

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 3: Maintain or improve visual integrity across the San Luis Valley-Taos Plateau. *SEZ Residual Impacts Addressed*: Visual Resources, Special Designated Areas, Environmental Justice, Socioeconomics *Guidance:* SLV RMP (1991), Taos RMP (2012); Rio Grande NF Plan (1996), Great Sand Dunes NP GMP (2007)	Objective 3.1. Preserve or enhance visual quality in the San Luis Valley and Taos Plateau landscape. Objective 3.2. Rectify or off-set visual impacts by improving visual quality at other priority sites within the landscape (potentially including viewsheds of Sangre de Cristo National Heritage Area, Rio Grande del Norte National monument, Blanca Peak Cumbres Toltec Railroad, Old Spanish NHT, communities of Romeo and Moffat, and the U.S. Highway 285 corridor). Objective 3.3 Remediate visual impacts that are present within areas outside SEZs designated as BLM VRM Class I or II lands. Objective 3.4 Rectify or off-set visual impacts by improving visual quality on BLM lands inventoried as having equal or greater VRI values than the impacted lands in the SEZ.	Site Outcome 3.1.1 When proposed mitigation lands are BLM-administered lands, the mitigation ratios for lands within the SEZ should consider the VRI Class of the SEZ lands being developed in relation to the VRI Class of the proposed mitigation lands. Potentially applicable for BLM-administered lands within the viewsheds of Sangre de Cristo National Heritage Area, Rio Grande del Norte National monument, Blanca Peak Cumbres Toltec Railroad, Old Spanish NHT, communities of Romeo and Moffat, and the U.S. Highway 285 corridor.	Site Action 3.1.1a. Rectify visual blight. Action 3.1.1.b. Install county transfer station as off-site mitigation. Action 3.1.1.c. Complete trash clean up events as offsite mitigation. Action 3.1.1.d. Clean existing trash dump sites and enforce trash dumping compliance as off-site mitigation. Action 3.1.1.e. Rectify color contrast-painting to current high contrast structures as offsite mitigation. Action 3.1.1.f. Complete historic restoration of buildings in local communities as off-site mitigation. Action 3.1.1.g. Apply vegetation treatment to minimize visual contrast on historic pinon-juniper chaining areas on Mt Blanca to provide off-site mitigation.	*Antonito SE SEZ* BLM: Hispano Cultural Landscapes; Rio Grande Corridor; Taos Plateau Pronghorn Assemblage; Brownie Hills; Cumbres Toltec NHL; Taos Plateau Big Game Migration; Limekiln- Greenie; West Fork of the North Branch of OST Segment Under Study Stakeholder: Mogote-Conejos, Rio Grande Corridor, Cumbres Toltec NHL (CPW); Rio Grande (TWS); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW, OSTA) *De Tilla Gulch SEZ* BLM: OSNHT; Fourmile Traditional Cultural Landscape; Sangres Foothills; Trickle Mountain-Saguache Creek; Tracey-Biedell; Stakeholder: Trickle Mountain-Saguache Creek, Tracey Biedell (CPW); De Tilla Gulch Areas 1-5 (TNC); Mineral Hot Springs, Findley Gulch (TWS); Elephant Rocks (DoW); Town of Saguache

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 3 (continued):	Objective 3.5 Amend RMPs for lands within VRM Class III or IV to a higher level of protection (VRM Class I or II) for areas that are visually intact with no cultural modifications and that have VRI values that are equal to or greater in value than those of the impacted lands in the SEZ, and placing a protective visual ACEC delineated around the mitigation area.		Action 3.1.1.h. Develop educational and interpretive materials to discourage future trash dumping as offsite mitigation.	*Los Mogotes East SEZ* BLM: Hispano Cultural Landscapes; Mogote-Conejos; Rio Grande Corridor; Brownie Hills; Cumbres Toltec; Taos Plateau Pronghorn Assemblage; Taos Plateau Big Game Migration; Limekiln- Greenie; West Fork of the North Branch of the OST Segment Under Study Stakeholder: Mogote-Conejos, Rio Grande Corridor, Cumbres Toltec NHL (CPW); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); Los Mogotes Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW, OSTA)
Landscape Goal 4: Air quality conditions near households and communities maintain EPA NAAQS and criteria pollutant standards, retain low contribution to ambient dust, promote Great Sand Dunes NP Class I Airshed Protected area visibility goals, and foster federal greenhouse gas (GHG) reduction goals	Objective 4.1 Offset soil surface modified and/or fugitive dust generated due to solar development at appropriate mitigation ratios, based on project design, level of vegetation retention, hydrologic condition and context in the San Luis Valley-Taos Plateau landscape.	Site Outcome 4.1.a Replace or offset proportionate soil surface acreage modified and/or fugitive dust generated, or due to solar development within 5-10 years of project initiation. Verify mitigation through use of PM monitoring and AIM terrestrial core indicator data.	Site Action 4.1.a.1 Expand existing or designate new ACECs, and define compatible uses or additional protections, including soil health protections, in land use planning. Action 4.1.a.2. Restore/re-vegetate retired agricultural circles and/or apply dust abatement efforts on dirt roads to provide offsite mitigation.	Mitigation sites to be determined based on public input.

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 4 (continued): *SEZ Residual Impacts Addressed*: Air, soil, environmental justice, socioeconomics *Guidance:* SLV RMP (1991), Taos RMP (2012); Rio Grande NF Plan (1996), Great Sand Dunes NP GMP (2007)	Objective 4.2. Restore, enhance, and protect disturbed soils and/or reduce fugitive dust on an area proportional to SEZ area developed at appropriate mitigation ratios, based on project design, level of vegetation retention, hydrologic condition and context in the San Luis Valley-Taos Plateau landscape	Outcome 4.2.a Restore or enhance equivalent surface extent of grassland-shrubland functional soil stability and condition lost to SEZ development, toward desired ecological state by a 25-50% vegetation cover "uplift" within 10-15 years of project initiation. Verify mitigation through use of AIM terrestrial core indicator data as well as data on the presence/absence of terrestrial wildlife and sensitive species.	Action 4.2.a.1. Rehabilitate/improve vegetative condition and extent to reduce soil erosion, including ripping/reseeding roads/routes to improve soil stability, to provide offsite mitigation.	
Landscape Goal 5: Mitigate socioeconomic impacts including lost revenue, sense of place, and quality of life resulting from public land solar energy development on host counties and people, including low income and minority communities.	Objective 5.1 Offset consequences to people and communities from solar land-use modifications that alter the ways in which people live, work, play, or generally cope as members of society or that change norms, values and beliefs that guide community-place identity in the San Luis Valley and Taos Plateau Landscape	Site Outcome 5.1. Rectify and offset socioeconomic burden via revised solar energy zones and/or community fund revenues resulting from public land solar energy development toward county cost-of-services in the San Luis Valley and Taos Plateau. Outcome 5.1.b Foster job training for solar energy technical work in the San Luis Valley and Taos Plateau Landscape.	Site Action 5.1. Develop joint federal-county-private renewable energy development areas in Conejos, Saguache, and Alamosa Counties landscape to provide offsite mitigation.	Mitigation sites to be determined based on Conejos County and public input.

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 5 (continued): *SEZ Residual Impacts Addressed*: Socioeconomics, environmental justice, ecosystem service functions of soil, water, air, ecology: terrestrial habitat, special status species, big game species, migratory birds *Guidance:* SLV RMP (1991), Taos RMP (2012); Rio Grande NF Plan (1996), Great Sand Dunes NP GMP (2007)	Objective 5.2 Offset the burden on low income and minority communities from the loss of ecosystem services including provision of grazing, open space, recreation, sustenance hunting, tourism, and other values (including intrinsic values) resulting from solar development.	Outcome 5.2.a Rectify illegal trash dumping areas roughly proportionate to SEZ area developed within 5 to 10 years of project initiation. Prioritize areas where public resources like the OSNHT are in use, as well as near communities of Moffat and Romeo. Outcome 5.2.b To replace recreational and hunting opportunities, restore or enhance equivalent target grassland-shrub land functional habitat acreage, condition, and biological function lost to SEZ development, toward desired ecological state by a 25-50% vegetation cover "uplift" within 10-15 years of project initiation. Verify mitigation through use of AIM terrestrial core indicator data, as well as data on the presence/absence of terrestrial wildlife and sensitive species.	Action 5.2.a.1 Restore and rectify illegal dumping and dump sites, disturbed soils and/or fugitive dust in the San Luis Valley-Taos Plateau landscape to provide offsite mitigation. Action 5.2.a.2. Establish a contributed community fund within affected communities. Action 5.2.b.1 Develop and maintain partnership with local community colleges to encourage the development of solar energy technical courses in environmental justice communities. Action 5.2.b.2 Compensate through mitigation bank funds County level assistance for cost of service infrastructure necessary for solar energy development on SEZ. Action 5.2.b.3 Through mitigation bank restore/re-vegetate retired agricultural areas in Environmental Justice communities.	

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 6: Surface water and groundwater quantity and quality, and watershed functions, are in compliance with Clean Water Act and other applicable water quality requirements, which maintain or improve sufficient water to support people, economies, wildlife and ecological systems. *SEZ Residual Impacts Addressed*: Surface water and groundwater, soil, environmental justice, socioeconomic *Guidance:* SLV RMP (1991), Taos RMP (2012); Rio Grande NF Plan (1996) Great Sand Dunes NP GMP (2007)	Objective 6.1. Replace or offset surface acreage and groundwater recharge area modified due to solar development at appropriate mitigation ratios, based on project design, level of vegetation retention, hydrologic condition and context in the San Luis Valley-Taos Plateau landscape. Objective 6.2. Enhance, rectify and protect surface water quality and groundwater recharge area modified due to solar development by reducing, avoiding, or eliminating soil erosion at appropriate mitigation ratios based on condition and context in the San Luis Valley-Taos Plateau landscape.	Site Outcome 6.1.a Replace or offset proportionate surface acreage or groundwater recharge area modified or diminished due to solar development within 5-10 years of project initiation. Verify mitigation through use of data on recharge type, amount and area, as well as AIM terrestrial core indicator data. Outcome 6.2.a Enhance, rectify and protect equivalent surface acreage and groundwater recharge area modified or diminished due to solar development, by reducing, avoiding, or eliminating soil erosion, and/or restoring or enhancing riparian and wetlands to provide natural water filtration within 5-10 years of project initiation. Verify mitigation through use of data on recharge type, amount and area, as well as AIM terrestrial core indicator data.	Site Action 6.1.a.1. Expand existing or designate new ACECs, and define compatible uses or additional protections in land use planning. Action 6.1.a.2 Purchase or acquire augmentation water as offsite migratory bird habitat. Action 6.2.a.1. Construct infrastructure improvements (i.e. ditches, dikes, headgates, etc.), to maximize wetlands habitats by maximizing existing water rights/ water use efficiencies as offsite migratory bird habitat. Action 6.2.a.2. Re-drill Blanca Wetlands/ McIntire-Simpson wells to produce adjudicated flows to create more wetlands as offsite migratory bird habitat.	*Antonito SE SEZ* BLM: Rio Grande Corridor; Taos Plateau Pronghorn Assemblage; Brownie Hills; Cumbres Toltec; Taos Plateau Big Game Migration; Limekiln- Greenie Stakeholder: Mogote-Conejos, Rio Grande Corridor, Cumbres Toltec (CPW); Rio Grande (TWS); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); Antonito SE Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW) *De Tilla Gulch SEZ* BLM: Poncha Pass; Trickle Mountain-Saguache Creek; Fourmile Traditional Cultural Landscape; Closed Basin Wetlands; Sangres Foothills; Tracey-Biedell; OSNHT Stakeholder: Poncha Pass, Trickle Mountain-Saguache Creek, Tracey Biedell (CPW); Poncha Pass, Closed Basin (SLVEC); De Tilla Gulch Areas 1-5 (TNC); Mineral Hot Springs, Findley Gulch (TWS); Elephant Rocks (DoW)

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 6 (continued):			Action 6.2.a.3. Acquire water rights in the Rio Grande to provide instream benefits to improve stream and riparian functionality and health to provide offsite mitigation for hydrology and migratory bird habitat. Action 6.2.a.4. Acquire water rights in the Conejos River to provide instream benefits to improve stream and riparian functionality and health to provide offsite mitigation for hydrology and migratory bird habitat. Action 6.2.a.5. Construct stream rehabilitation and erosion control structures to improve stream and riparian functionality and health to provide offsite mitigation for soils, hydrology and migratory bird habitat.	*Los Mogotes East SEZ* BLM: Mogote-Conejos; Rio Grande Corridor; Brownie Hills; Cumbres Toltec; Taos Plateau Pronghorn Assemblage; Taos Plateau Big Game Migration; Limekiln- Greenie Stakeholder: Mogote-Conejos, Rio Grande Corridor; Cumbres Toltec (CPW); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); Los Mogotes Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW)

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 7: Soil health exhibits functional, biological and physical characteristics that are appropriate to soil type, climate and landform, and retain soil conditions including soil stability, land cover, and characteristics that meet BLM's land health standards, contribute to public health and safety, avoid damages to natural site characteristics, and contribute to economic productivity and ecological sustainability. *SEZ Residual Impacts Addressed*: Soil, water/hydrology, air, ecology- terrestrial habitat, sensitive species, migratory birds, environmental justice, socioeconomics *Guidance:* SLV RMP (1991), Taos RMP (2012); Rio Grande NF Plan (1996), Great Sand Dunes NP GMP (2007)	Objective 7.1. Replace or offset soil surface modified and/or fugitive dust generated due to solar development at appropriate mitigation ratios, based on project design, level of vegetation retention, hydrologic condition and context in the San Luis Valley-Taos Plateau landscape. Objective 7.2. Restore, enhance, and protect disturbed soils and/or reduce fugitive dust on an area proportional to SEZ area developed at appropriate mitigation ratios based on project design, level of vegetation retention, hydrologic condition and context in the San Luis Valley-Taos Plateau landscape	Site Outcome 7.1.a Replace or offset proportionate soil surface acreage modified or diminished due to solar development within 5-10 years of project initiation. Verify mitigation through use of data on recharge type, amount and area, as well as AIM terrestrial core indicator data. Outcome 7.2.a Restore or enhance equivalent surface extent of grassland-shrubland functional soil stability and condition lost to SEZ development, toward desired ecological state by a 25-50% vegetation cover "uplift" within 10-15 years of project initiation. Verify mitigation through use of AIM terrestrial core indicator data, as well as data on the presence/absence of terrestrial wildlife and sensitive species.	Site Action 7.1.a.1. Expand existing or designate new ACECs, and define compatible uses, or additional protections, in land use planning. Action 7.1.a.2. Restore/re-vegetate retired agricultural circles and/or apply dust abatement efforts on dirt roads to provide offsite mitigation. Action 7.2.a.1. Construct stream rehabilitation and erosion control structures to improve stream and riparian functionality and health to provide mitigation for soils, hydrology and migratory bird habitat. Action 7.2.a.2. Rehabilitate/improve vegetative condition and extent to reduce soil erosion including ripping/re-seeding roads/routes to improve soil stability to provide offsite mitigation.	*Antonito SE SEZ* BLM: Rio Grande Corridor; Taos Plateau Pronghorn Assemblage; Brownie Hills; Cumbres Toltec; Taos Plateau Big Game Migration; Limekiln- Greenie Stakeholder: Mogote-Conejos, Rio Grande Corridor, Cumbres Toltec (CPW); Rio Grande (TWS); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); Los Mogote Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW) *De Tilla Gulch SEZ* BLM: Poncha Pass; Trickle Mountain-Saguache Creek; Fourmile Traditional Cultural Landscape; Closed Basin Wetlands; Sangres Foothills; Tracey-Biedell; OSNHT Stakeholder: Poncha Pass, Trickle Mountain-Saguache Creek, Tracey Biedell (CPW); Poncha Pass, closed Basin (SLVEC); De Tilla Gulch Areas 1-5 (TNC); Mineral Hot Springs, Findley Gulch (TWS); Elephant Rocks (DoW)

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 7 (continued):			Action 7.2.a.3. Build & maintain enclosures when necessary to jump-start vegetation recovery.	*Los Mogotes East SEZ* BLM: Mogote-Conejos; Rio Grande Corridor; Brownie Hills, Cumbres Toltec; Taos Plateau Pronghorn Assemblage; Taos Plateau Big Game Migration; Limekiln- Greenie Stakeholder: Mogote-Conejos, Rio Grande Corridor, Cumbres Toltec (CPW); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); Los Mogotes Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW)
Landscape Goal 8: Visitor experience resources and values are identified, preserved and protected to ensure that they are available for appropriate uses by present and future generations. Visual and scenic resources including naturalness and beauty, backcountry recreation setting, and wilderness quality lands are preserved and protected, *SEZ Residual Impacts Addressed*: Environmental Justice, Visual Resources, Socioeconomics, Special Designation Areas; Lands with Wilderness Characteristics	Objective 8.1. Protect and/or enhance visual and scenic resources including the natural character of the landscape in the San Luis Valley.	Outcome 8.1.a No net loss of scenic experience (day and night), as seen from visually-sensitive Specially Designated Areas. Outcome 8.1.b For the degradation of visual values of the lands within the SEZs from solar development, compensatory mitigation should be based on the VRI class for the SEZ:	Action 8.1 For every acre/linear mile of a Special Designation with residual visual effects within the viewshed of the project, provide funds to enhance visual resources, on a sliding scale based on distance from the project.	*Antonito SE SEZ* BLM: Rio Grande Corridor; Taos Plateau Pronghorn Assemblage; Brownie Hills; Cumbres Toltec; Taos Plateau Big Game Migration; Limekiln- Greenie Stakeholder: Mogote-Conejos, Rio Grande Corridor, Cumbres Toltec (CPW); Rio Grande (TWS); Illegal Dump sites (CCCW); Rio Grande Corridor (SLVEC); Antonito SE Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW)

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Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 8 (continued): *Guidance:* SLV RMP (1991), Taos RMP (2012); Rio Grande NF Plan (1996), Great Sand Dunes NP GMP (2007)	Objective 8.2. Protect and/or preserve opportunities for backcountry recreation, including primitive, unconfined recreation and opportunities for solitude in the San Luis Valley. Objective 8.3. Protect and/or enhance lands with wilderness characteristics in the San Luis Valley. Objective 8.4 Rectify and enhance visual resources, including reducing high contrasts associated with solar development in the San Luis Valley - Taos Plateau.	Outcome 8.2.a. Protect or preserve naturalness and beauty, backcountry recreation opportunities, and wilderness characteristics through BLM ACEC designations, land acquisitions, conservation easements, or public access easements within 5-10 years of project initiation.	Action 8.2 Identify and designate existing suitable areas as Special Designation Areas to protect and preserve values such as scenic values, feelings of naturalness and solitude, and enhanced recreational opportunities. Action 8.3 Remove structures and facilities from WAs and WSAs that are unrelated to the preservation or enhancement of wilderness characteristics or necessary for the management of uses allowed under the land use plan, to increase naturalness and reduce visual impacts within these areas. Action 8.4 Reclamation of visual impacts that are present within other areas designated as BLM VRM Class I or II lands (so that the impacts are no longer visible in the long-term).	*De Tilla Gulch SEZ* BLM: OSNHT; Fourmile Traditional Cultural Landscape; Sangres Foothills; Trickle Mountain-Saguache Creek; Tracey-Biedell Stakeholder: Trickle Mountain-Saguache Creek, Tracey Biedell (CPW); De Tilla Gulch Areas 1-5 (TNC); Mineral Hot Springs, Findley Gulch (TWS); Elephant Rocks (DoW) *Los Mogotes East SEZ* BLM: Mogote-Conejos; Rio Grande Corridor; Brownie Hills; Cumbres Toltec; Taos Plateau Pronghorn Assemblage; Taos Plateau Big Game Migration; Limekiln- Greenie Stakeholder: Mogotes (TWS); Mogote-Conejos, Rio Grande Corridor (CPW); Rio Grande Corridor (SLVEC); Los Mogotes Areas 1-3 (TNC); Triangle, Los Mogotes North, South San Luis Hills, Twin Lakes (DoW)

Table 2-10. Summary Table of Recommended Regional Goals, Landscape Objectives, Mitigation Desired Outcomes, Potential Mitigation Actions, and Potential Mitigation Sites for the Colorado Solar Energy Zones[11]

Regional or Landscape Goals/RMP Guidance	Landscape Objectives	Mitigation Desired Outcomes	Potential Mitigation Actions	Potential Mitigation Sites[12]
Landscape Goal 8 (continued):			Action 8.5 Mitigation on BLM lands inventoried as having equal or greater VRI values than the SEZ impacted lands. Action 8.6 Re-allocate lands within VRM Class III or IV to a higher level of protection (VRM Class I or II) for areas that are visually intact with no cultural modifications and that have VRI values that are equal to or greater in value than those of the SEZ impacted lands, and placing a protective visual ACEC delineation around the mitigation area. Action 8.7 Preserve lands with wilderness characteristics through BLM ACEC designations, land acquisitions, conservation easements, or public access easements.	

Abbreviations for Table 2-10: ACEC – Area of Critical Environmental Concern, CCCW – Conejos County Clean Water, CPW – Colorado Parks & Wildlife, DOW – Defenders of Wildlife; Great Sand Dunes NP GMP – Great Sand Dunes National Park General Management Plan, NF – National Forest, NHL – National Historic Landscape; NHT – National Historic Trail; NSTA – National Trails System Act; OSNHT – Old Spanish National Historic Trail; OST – Old Spanish Trail; OSTA – Old Spanish Trail Association; SLVEC - San Luis Valley Ecosystem Council, SLV RMP – San Luis Valley Regional Management Plan, TNC – The Nature Conservancy; TWS – The Wilderness Society.

2.6 Recommended Mitigation Obligation for Colorado Solar Energy Zones

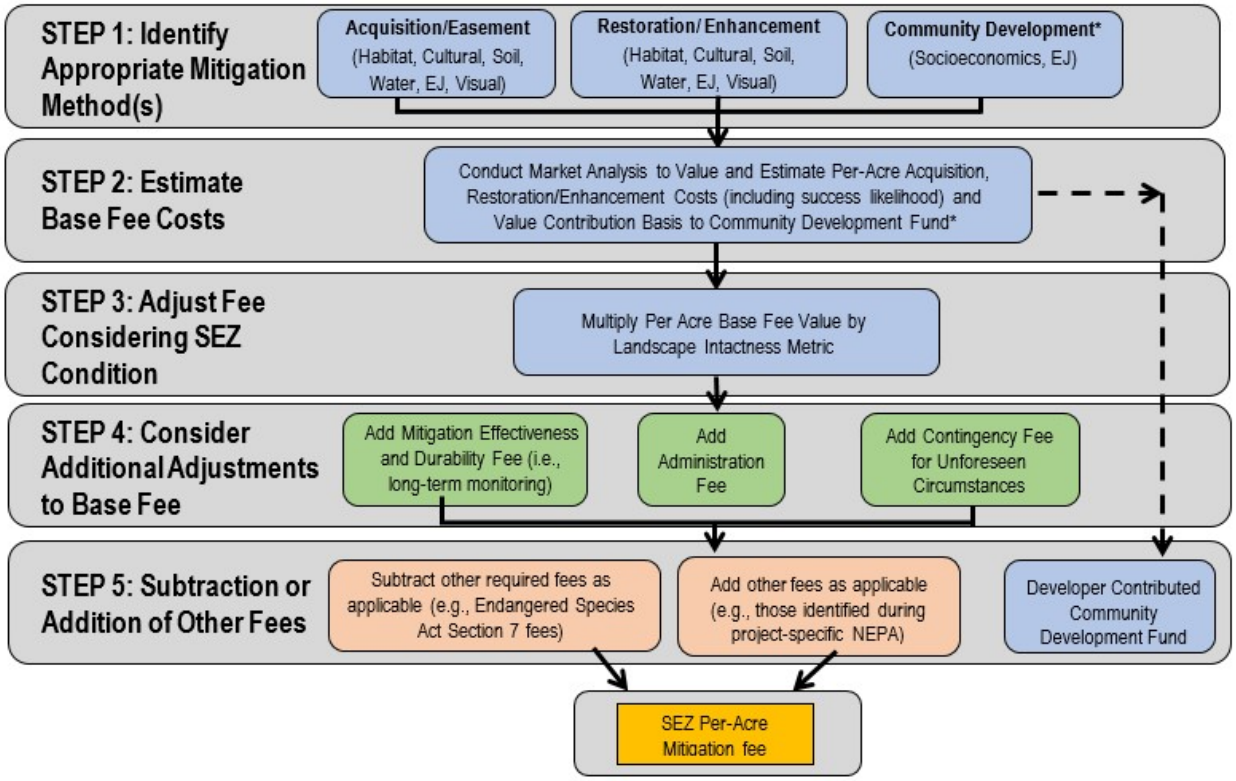
In this section BLM recommends a regional mitigation obligation based on residual impacts that may warrant regional compensatory mitigation for the Colorado SEZs, as summarized in Section 2.4.3.2.2. The BLM recognizes that several options are available to satisfy compensatory mitigation obligations for residual impacts of solar development in SEZs. These options include a) proponent-responsible compensatory mitigation, b) purchasing credits from BLM-approved mitigation banks or conservation/mitigation exchanges (if available), and c) contributions to a compensatory mitigation fund.

This section provides BLM's recommended method and process based on contributions to a mitigation fund (Option c) and a step-wise, estimated cost of impact basis and calculation. The BLM presents mitigation action reference costs (base fees) and a recommended project mitigation fee for the Colorado SEZs used to inform BLM's subsequent identification of an appropriate compensatory mitigation fee. Under this option, BLM recommends that the long-term responsibility for compensatory mitigation be transferred away from the authorized land user (solar developer) with payment of a predetermined fee based on the type and magnitude of the identified residual impacts warranting compensatory mitigation.[16] The fee would be paid before development commences, but would be managed to provide for the selected mitigation actions over the life of the project impacts. If contribution to a mitigation fund is selected as the mitigation method in coordination with the developer, the likely fee will be identified before parcels are made available for auction. The fee will include updates to reflect current costs of acquisition and/or restoration, and may also include costs for compensatory mitigation for impacts warranting mitigation not previously included in the fee (e.g., cultural impacts and Native American concerns). Also, just prior to issuing a notice to proceed with construction, BLM may adjust that fee in order to include costs based on impacts that require consideration of project-specific data (e.g., impacts to visual resources). The final compensatory mitigation fee will be paid by the developer at the issuance of the Notice to Proceed (see Table 1-1).

BLM's recommended SEZ mitigation fee calculation process for the three Colorado SEZs is founded on the Dry Lake SEZ SRMS process and draft Procedural Guidance (BLM2014a) and modified through stakeholder input. The recommended process is presented in Figure 2-27 as a flow diagram, and in step-wise narrative below. The flow diagram describes the calculation of potential fees associated with the impacts warranting compensatory mitigation.

Step 1: *Identification of the mitigation method, or combination of methods*: The BLM recommends that the mitigation fee for Colorado SEZs be based on a combination of mitigation methods, including acquisition and restoration/enhancement that would offset residual impacts to resources. Acquisition and restoration/enhancement of an area functionally equivalent to that used for a given solar project is assumed to offset residual impacts to the vegetation community and to the ecosystem services provided by that community (i.e., soils, water, air quality, terrestrial wildlife, migratory birds, and viewsheds).

[16] If proponent-responsible compensatory mitigation is utilized, project-level NEPA should seek to demonstrate that residual impacts warranting mitigation are offset in a way that meets regional mitigation needs, and that the mitigation is additive and durable. Monitoring and reporting on the success of the mitigation should also be included.



*For this assessment, contributions to a community fund as compensatory mitigation are recommended but not included as a component of the per-acre mitigation fee. This is discussed further in Step 5 below. Additionally, preservation through new land use planning and designations is acknowledged as an important form of mitigation but related costs are not included in the recommended fee. BLM land use planning costs are assumed internal to BLM operations.

Figure 2-27. BLM Recommended Steps for Calculating Per-Acre Regional Compensatory Mitigation Fees for Three Colorado SEZs Based on Impacts

Step 2*: Estimate Costs for the Base Fee*: The BLM recommends a base fee for compensatory mitigation in the Colorado SEZs based on market data on local acquisition and restoration and enhancement costs compiled by BLM staff, as presented in Tables 2-11 and 2-12.

The range of acquisition costs presented in Table 2-11 are based on average per acre farmland values in Colorado between 2010 and 2014, as summarized by the U.S. Department of Agriculture (USDA 2014). The values range from $1,200 to $1,350 per acre, with an average cost of about $1,275 per acre.

The range of restoration costs presented in Table 2-12 include costs for actions to restore similar vegetation and habitat to that which would be lost in the SEZs, specifically costs for seeding and weed control. The BLM recommends that these costs be the basis for the restoration base fee (cost estimates for other types of mitigation actions are presented in Table 2.14 in Section 2.8). The cost for aerial

Table 2-11. Sources of Land Values Used as Acquisition Cost Assumptions

Type	Value ($/Acre)	Source
Colorado Non-Irrigated Crop Land	$1,200	USDA (2014)
All Colorado Farm Land	$1,350	USDA (2014)

Table 2-12. Sources of Restoration Action Costs Used as Restoration Cost Assumptions

Mitigation Measure	Cost	Agency-Proponent	Source	Project
Aerial seeding of sagebrush in Idaho	Approximately $14/acre	BLM	BLM Idaho	Various Projects (2011)
Seeding (including purchasing, collecting, and application)	$1,400/acre	BLM	BLM Dry Lake Valley North SRMS	None currently
Weed Control in SLV	$112-600/acre	BLM, FS	BLM, FS weeds program	Various Weeds projects (2014)

seeding is estimated at approximately $14 per acre. The costs for more comprehensive seeding activities (including purchasing, collecting, and application) are estimated at $1,400 per acre. The range assumed for seeding for the base fee is $14 to $1,400 per acre with a mean of $707 per acre. The costs for weed control range from about $112 to $600 per acre, with a mean of $356 per acre.

On the basis of IDT knowledge, stakeholder input, and data from climate change models, the BLM assumes a representative mitigation ratio of 3:1 could achieve conservation gain goals and objectives. This equates to a level of restoration success of about 33%, that is, to achieve conservation gain goals and objectives 3 acres of land will be required for restoration for each acre of SEZ land that is developed. The selected mitigation ratio was informed by a stakeholder exercise (TNC 2015), which applied published studies and methodology (NOAA 2006, Martin et al, 2016) to the San Luis Valley/Taos Plateau. The stakeholder exercise considered the following criteria: probability of success, timing relative to impacts, and timing to maturity. The exercise identified a range of potentially applicable mitigation ratios for different mitigation actions from 1:1 up to 40:1.

Step 3: *Calculate the Adjusted Base Fee*: Since the base per-acre mitigation fee from Step 2 represents the costs of restoring to a completely pristine landscape, the BLM recommends adjusting the base fee to reflect the actual landscape intactness within the SEZs. To do this, the current intactness of the Basin Grassland and Shrubland vegetative community, which is the dominant vegetation community on the SEZs, was used as an estimate of the intactness of the SEZs. The SEZ intactness index value is relative to a completely intact landscape. Therefore, the adjustment based on SEZ intactness was made by multiplying the average landscape intactness index value for the three SEZs by the base fee.

On the basis of the landscape intactness modeling conducted for the LA (Walston et al. 2016) and summarized in Table 2-5, the average landscape intactness index value for the three SEZs was very similar for all three, ranging from 0.549 for the De Tilla Gulch SEZ to 0.589 for the Los Mogotes East SEZ. Because these values are essentially the same, a single average intactness index (i.e., 0.57) was used to adjust the per-acre mitigation fee for all of the Colorado SEZs, as follows:

Adjusted Base Per-Acre Mitigation Fee for the Colorado SEZs = Base Fee * 0.57 (intactness index)

The BLM could also consider indicators of rangeland or public land health (Pellant et al. 2005) as an objective, verifiable means to establish adjustments to the per-acre mitigation fee on the basis of the existing conditions of the SEZ lands as documented through the AIM process. Because these data are not currently available for the Colorado SEZs, the BLM is not recommending public land health indicator data as the basis for adjusting the mitigation fee.

Step 4: *Additional adjustments to the fee*

Step 4A: *Add Per-Acre Effectiveness and Durability Adjustment:* The BLM recommends that a standard effectiveness and durability fee to cover monitoring and adaptive management be applied to regional compensatory mitigation fees. The BLM recommends that the effectiveness and durability adjustment be applicable over the duration of project impacts. For the San Luis Valley-Taos Plateau area, the BLM estimates that effectiveness and durability adjustment would be necessary over a 40 to 60-year life-of-impacts period (based on grassland-shrubland recovery in the De Tilla Gulch SEZ area since 1950). For this estimate of appropriate mitigation fees, the mid-range duration of 50 years is assumed.

The cost for long-term monitoring of the success of restoration is currently estimated to be $5 per acre per year. This assessment assumed the annual monitoring cost of $5/acre over a duration of 50 years (that is, $250 per acre total).

The $250 per acre fee is a preliminary estimate. The cost of monitoring will vary based on the mitigation action and site that is selected. Therefore, the monitoring fee may be adjusted at the time of the lease sale or project permitting based on site-specific criteria, including:

- distance to monitoring site and associated travel and staff costs
- type of monitoring being conducted
- type of mitigation action being monitored

Because law enforcement is a standard activity for BLM, it is not considered to be additive and therefore fees for these actions were not included in the effectiveness and durability adjustments.

Step 4B: *Add Administration and Contingency Fees:* The BLM recommends an administration fee of 5% for management and reporting of regional compensatory mitigation funds. Additionally, a fee to account for any unforeseen future circumstances (contingency fee) should be included. For example, a fire is one of many possible contingencies that could reduce the effectiveness of reseeding. A 10% contingency fee is assumed for this assessment, based on the Lower Colorado River Habitat Restoration Plan (LCRMSCP 2004) and professional judgment.

Step 5: *Subtract or add other fees*: The Colorado SEZs are not located in an area subject to any Section 7 permitting fees for federally-listed species under the Endangered Species Act. Because there are no ESA-listed species or critical habitat identified within the SEZs, no adjustment for ESA-listed species impacts is included in the fee calculation.

At this time BLM's recommended mitigation fees do not include a component for mitigation of cultural resources because consultation for cultural resources would occur during project-specific NEPA evaluations. If compensatory mitigation is identified as warranted for addressing cultural impacts during

future project-specific evaluations, the required mitigation fee to compensate for those impacts would be determined separately from the process described in this section.

Similarly, the recommended mitigation fees described in this section do not include a component for mitigation of visual resources. The determination of visual resource impacts must be done at the project-specific level, because the locations of solar projects within the SEZ and the type of solar technology have a major effect on the impacts. Although compensatory mitigation has been identified as potentially warranted for addressing visual impacts to the SEZs (see Section 2.4.3.2.2.) and to some visually sensitive areas (see Section 2.5), the specific visually-sensitive areas impacted will not be known until project-specific NEPA evaluations are available. Therefore, appropriate compensatory mitigation fees for visual impacts, if any, must be determined at the project-specific level.

Based on socioeconomic and environmental justice impacts (that is, relative benefit to burden to adjacent low-income and minority populations) associated with solar development in the Colorado SEZs, BLM recommends contributed funds toward establishment of a community fund for compensatory mitigation. Because existing private land solar projects in the San Luis Valley have included contributed funds negotiated between the developer and local municipalities, the specific monetary contributions are not estimated or included in the per acre mitigation fee. However, the basis for possible valuation of such contributed funds is included in Table 2.14.

Recommended Compensatory Mitigation Fee for Colorado SEZs: Table 2-13 provides the recommended per acre fee for the Colorado SEZs, which includes components for restoration success, condition of the SEZ, effectiveness and durability, administration fees, and a contingency fee. The likely compensatory mitigation fee for each SEZ will be identified as part of the decision to issue a lease, and may include adjustments for changes in land value, inflation, refined estimates of restoration costs, and costs for impacts not previously included (e.g., for cultural resource or visual resource impacts).

Prior to collecting the fee and after the project-specific NEPA evaluation, the fee may again be adjusted for inflation and/or for costs not previously included (e.g., for cultural resource or visual resource impacts). The BLM recommends a value of approximately $3,213 per acre as the per-acre compensatory mitigation fee for the Colorado SEZs.

Table 2-13. Components of the Recommended Per Acre Compensatory Mitigation Fee for the Colorado Solar Energy Zones

Activity or Adjustment	Antonito Southeast, De Tilla Gulch, and Los Mogotes East SEZ Recommended Fee ($)[a]
STEPS 1 AND 2: Identify Actions and Cost Components for Base Fee	
Per Acre Acquisition Cost (based on costs of non-irrigated cropland [$1,200] and farm land [$1,350])	1,275
Restoration – Average of range for aerial seeding of $14/ acre, or for more comprehensive seeding, $1,400/acre	707
Restoration: Average of range for weed control (range of $112 to $600 per acre)	356
Restoration Success – (use 3:1 mitigation ratio, i.e., [seeding + weed control] x 3)	3,189
SEZ Base Fee (sum of acquisition and restoration success cost, using a 3:1 mitigation ratio)	**4,464**
STEP 3: Adjusted Base Fee	
Base Fee * Landscape Intactness Index (0.57)	2,544
STEP 4: Additional Adjustments	
Effectiveness and Durability for Long-term Monitoring - $5/acre/year for 50 years	250
Adjusted Fee Subtotal (sum of adjusted base fee and long-term monitoring	2,794
Administration Fee (5% of Adjusted Fee Subtotal)	140
Contingency Fee (10% of Adjusted Fee Subtotal)	279
Adjusted Fee (sum of adjusted fee subtotal, administration fee, and contingency fee)	**3,213**
STEP 5: Other Fees	
(ESA, other impacts - none currently identified	-
Community Fund - determined separately	-
Recommended Per Acre Fee (Adjusted Fee + Other Fees)	**3,213**

[a] The approximate recommended developable acres are as follows: Antonito Southeast SEZ – 8,500 acres; De Tilla Gulch SEZ – 1,000 acres, Los Mogotes East SEZ – 2,600 acres

2.7 Administration of BLM CO Solar Regional Compensatory Mitigation Obligation Funds and Fees

The BLM will select management options for SEZ mitigation fees that are consistent with Departmental policy (DOI 2015) and BLM's policy on regional mitigation (BLM 2016), which include guidance for management of funds collected as part of the restoration, acquisition, or preservation portion of the total mitigation obligation by an independent third party. BLM Colorado will incorporate the most recent departmental mitigation policy to implement a transparent and effective accounting system to track funds contributed and funds spent, and to establish a funding mechanism to cover administration, durability, monitoring, and reporting for the investments for the duration of the impacts from development in the SEZs.

Compensatory mitigation funds will be used only for compensatory mitigation to address the impacts from solar development in the SEZs. Compensatory mitigation funds from several solar projects may be pooled to accomplish mitigation actions. The BLM will select management options for mitigation funds that ensure that the funds are managed and expended for the identified purposes and according to applicable law, regulation, and policy.

BLM would prefer that an independent third party manage compensatory mitigation funds. An appropriate third party fund manager should be neutral, well-established, and provide transparent financial management services, including low management fees and tax-free growth of funds that could result in more financial resources to fund on-the-ground mitigation actions. While it is permissible for the BLM to manage mitigation funds, the agency is discouraged from doing so due to increased workloads on BLM staff, overhead rates charged by the BLM's National Operations Center, etc. Third Party managers can provide transparent financial management with low fees, contract administration and tax-free growth of funds that could result in more financial resources to fund on-the-ground mitigation actions. Regardless of whether BLM or a third-party manages the fund, the full costs to manage the funds would be included when determining the cost of compensatory mitigation.

The project-specific decision for each project will specify what types of compensatory mitigation actions will be funded, if any, including how they will contribute to meeting mitigation goals. A management agreement may be set up between BLM, the entity contributing the mitigation funds, and the BLM may retain a third party fund manager. The agreement might include the amount of funding BLM is accepting, the resource outcomes that will be achieved with the funds, discussion of how durability of the mitigation will be ensured, timelines for expending the funds, discussion of how additionality will be ensured,[17] accounting for administrative and contingency fees, and details on reporting requirements.

2.8 Evaluation of Compensatory Mitigation Sites, Actions, and Desired Outcomes

During 2015, and based on varied approaches and criteria, BLM and stakeholders proposed 44 regional compensatory mitigation sites and corresponding actions to mitigate for the impacts to resources that will occur as a result of solar development in the Colorado SEZs and that were determined to warrant compensatory mitigation (See Table 2-10 and Figure 2-28). Based on IDT review and stakeholder input, the BLM considered many regional compensatory mitigation sites, outcomes,

[17] "Additionality" means that the funds would not be spent for any action that should be done by BLM or another entity independent of the compensatory mitigation requirements.

and actions in the broad categories of: 1) acquisition and establishment; and 2) restoration and enhancement.

Because of the large number of sites and actions proposed, a two-step process was employed to evaluate the recommendations. First, an exercise was conducted to identify the most-promising candidate sites based on a number of criteria (Section 2.8.1). Those sites were further evaluated using a candidate site matrix screening tool (Section 2.8.2). The assessment of mitigation sites, actions and preliminary cost estimates are summarized in Section 2.8.3.

2.8.1 Narrowing Exercise for Compensatory Mitigation Candidate Sites

In order to narrow and prioritize, a two-step spreadsheet and GIS process was employed to evaluate and compare the 44 proposed mitigation sites reviewed at the May 2015 stakeholder workshop (Figure 2-28). This section overviews the first step. The proposed sites were first scored, weighted, and ranked based on the following criteria:

1. *Regional Objective Achievement Potential:* Seven BLM IDT members individually scored all 44 sites based on meeting or not meeting 24 landscape objectives as defined in Table 2-10. Those scores were averaged to characterize Regional Objective Achievement Potential. BLM applied a 25% total score weight to this criterion to emphasize importance.

2. *Mitigation Site Coincidence*: BLM quantified candidate mitigation site coincidence statistics in GIS to rank overlap of mitigation sites with each other site. BLM applied a 15% total score weight to this criterion to emphasize stakeholder input and broad screening overlap.

3. *Landscape Assessment Conservation Element Coincidence*: BLM quantified the number of conservation elements with locations coinciding with the site location in GIS and normalized from 0 to 1. BLM applied a 10% total score weight to this criterion.

4. *Vegetation Replacement*: BLM quantified LANDFIRE Existing Vegetation type (USGS 2010) amount within the site similar to the vegetation within each SEZ (separate score calculated for each SEZ) in GIS. BLM applied a 10% total score weight to this criterion.

5. *Crucial Habitat Assessment Overlap:* BLM quantified CHAT crucial habitat overlap in GIS as designated by the Western Association of Fish and Wildlife Agencies. The ranking for each site was calculated, as detailed in Comer and Hak (2012). BLM applied a 10% total score weight to this criterion.

6. *Cultural Mitigation Score*: BLM quantified the sum of the cultural value and cultural risk scores as detailed in the Landscape-Level Cultural Heritage Values and Risk Assessment (Wescott et al. 2016), in GIS, normalized from 0 to 1. BLM applied a 10% total score weight to this criterion.

7. *Visual Mitigation Score*: BLM quantified the number of acres of VRI Classes I and II within the site, in GIS, normalized from 0 to 1. BLM applied a 10% total score weight to this criterion.

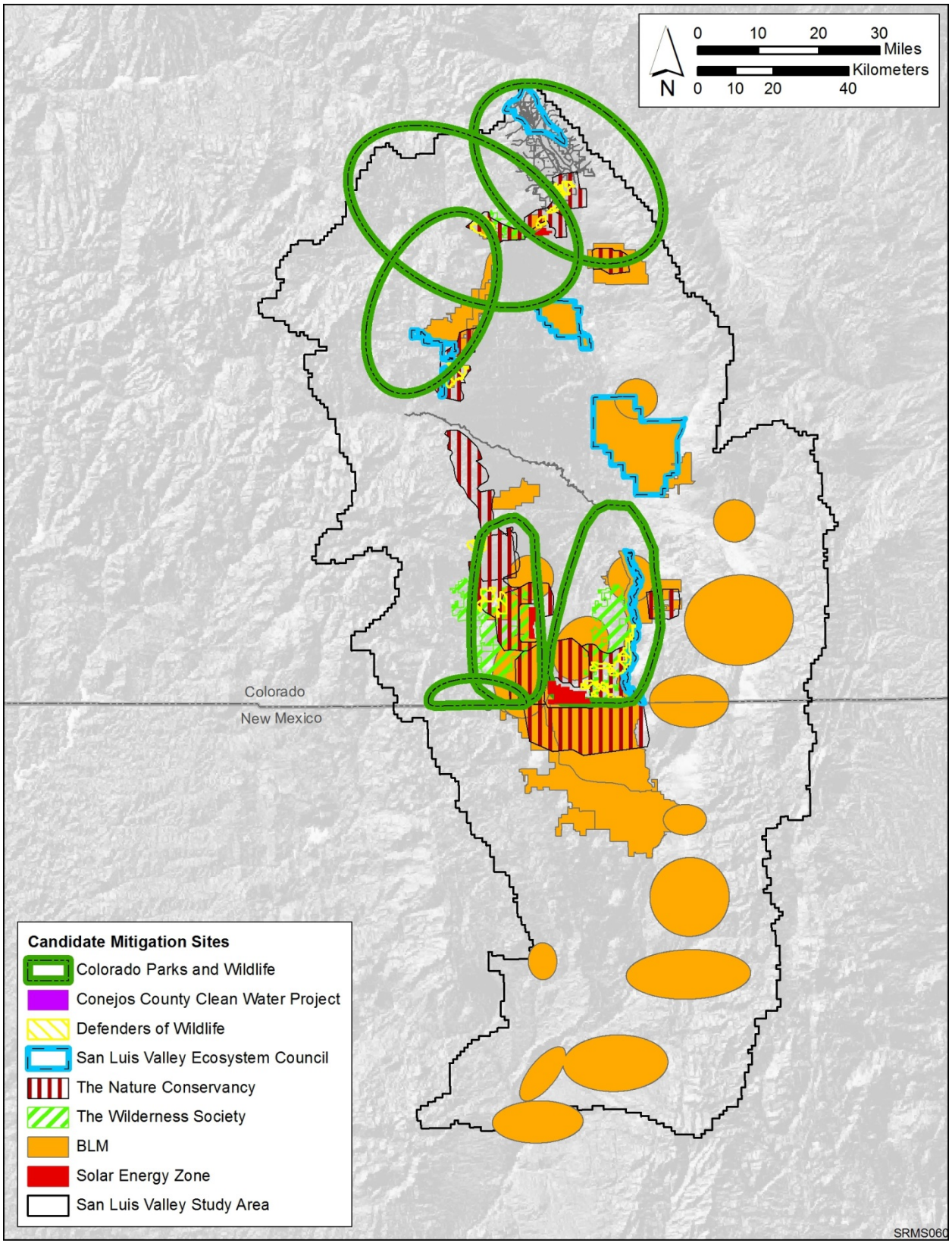


Figure 2-28. BLM and Stakeholder Recommended Regional Compensatory Mitigation Sites

This exercise is one means of evaluating the candidate sites for their ability to address multiple resource impacts more efficiently. However, this method does not preclude the BLM authorized officer from choosing specific mitigation sites to address resource-specific impacts (e.g., choosing a site that primarily mitigates for only cultural resource impacts to address cultural resource impacts from SEZ development) at the time of project authorization. Analysis and scores for each site are available in the Excel spreadsheet titled "Mitigation Site Scoring.xlsx", posted on the SRMS project website (http://www.blm.gov/co/st/en/fo/slvfo/solar.html). The five highest scoring sites for each SEZ were passed forward to the next step of the evaluation (see Section 2.8.2).[18]

2.8.2 Candidate Site Matrix Screening Tool

The following recommended compensatory mitigation sites for each SEZ (listed in ranking order with the submitter in parentheses) were scored based on the outcome of the narrowing exercise described above.

Antonito Southeast SEZ: 1) Antonito Southeast Area 3 (The Nature Conservancy or TNC), 2) Taos Plateau Big Game Migration (BLM), 3) Taos Plateau Pronghorn Assemblage (BLM), 4) Antonito Southeast Area 2 (TNC), and 5) NHA Hispano Cultural Landscapes (Valdez 2014).

Los Mogotes SEZ: 1) Taos Plateau Big Game Migration (BLM), 2) Antonito Southeast Area 3 (TNC), 3) Los Mogotes (The Wilderness Society or TWS), 4) Mogotes Conejos (BLM), and 5) NHA Hispano Cultural Landscapes (Valdez 2014).

De Tilla Gulch SEZ: 1) Trickle Mountain Saguache Creek (BLM), 2) Sangres Foothills and De Tilla Gulch Area 3 (BLM and TNC), 3) Poncha Pass (BLM and San Luis Valley Ecosystem Council), 4) De Tilla Gulch Area 4 (TNC), and 5) Tracy Biedell (BLM).

BLM score these sites relative to their values and ability to mitigate the residual impacts identified based on the following:

- *Residual Impacts*: Site and its proposed actions would mitigation for all or most identified residual impacts that warrant compensatory mitigation.
- *Mitigation Goals-Objectives*: Site and its proposed actions would meet conservation/ mitigation goals, objectives, and desired outcomes.
- *Resource Management Plan (RMP) Consistency*: Site and its proposed actions would be consistent with the BLM RMPs.
- *Ecological-Biological Functional Values*: Site represents similar landscape value, ecological functionality, biological value, species, habitat types, and/or natural features as the SEZ.

[18] Colorado Parks and Wildlife (CPW) recommended sites were very large areas recommended as areas of mitigation interest by the CPW (see Figure 2-28). Therefore, in order to identify smaller recommended sites rather than large general areas, high scoring CPW sites from the narrowing exercise were not evaluated as candidate sites using the matrix screening tool. Instead, coincidence with a CPW site was listed as a scored criterion in the matrix and other recommended sites that were within or partially within CPW recommended sites received an extra point in the scoring.

- *Ecological subregion*: Site is within the same ecoregion and ecological subregion as the SEZ (i.e., the San Luis Valley and Taos Plateau Planning Areas).

- *Extent*: Sites would provide adequate geographic extent (at least as large as the developable area of the SEZ)

- *Colorado Parks & Wildlife Priority (CPW)*: Site is within or intersects a CPW recommended site

- *Mitigation Feasibility*: Compensatory mitigation at the site would be feasible (as indicated by level of documentation, difficulty of implementation, time frame needed to establish the site and achieve mitigation goals and objectives, and the cost estimate for the compensatory mitigation actions).

- *Mitigation Effectiveness and Durability*: Effectiveness and additionality of the site and actions based an extent to which the full spectrum of mitigation goals could be met simultaneously, the extent to which conservation and restoration of ecosystem intactness would be achieved, and the mitigation actions would consist of actions that would not otherwise be undertaken by the BLM (additive actions).

- *Mitigation Risk*: Risk of failure of compensatory mitigation actions at the site, based on known constraints and known current and future surrounding land uses.

- *Mitigation Durability*: Durability of the compensatory mitigation actions and sites, based on timeframe of the proposed designation and predicted intensity of climate change in the area.

2.8.3 Assessment of Mitigation Sites, Actions and Preliminary Cost Estimates

The BLM presents summarized scoring results and a matrix table for candidate compensatory mitigation sites for the Colorado SEZs in Appendix E. Siting of multiple utility-scale solar energy projects at different times over the course of SEZ development is likely. The technology, scale, and schedule of these developments would influence the prioritization of compensatory mitigation options. In order to allow future flexibility, the BLM will consider multiple potential mitigation actions and sites listed above and in Appendix E. The determination of required compensatory mitigation actions and sites will be conducted based on project-specific NEPA assessments, which would tier to the Solar PEIS and consider recommendations from this SRMS document.

The top scoring compensatory mitigation sites for the Antonito Southeast and Los Mogotes SEZs in the candidate site matrix included the Antonito Southeast Area 2 and 3 sites proposed by TNC and the Taos Plateau Pronghorn Assemblage site proposed by the BLM (see Figure 2-29). The TWS Los Mogotes site also scored in the top tier. BLM recommends these sites as priority sites for range of alternative development in future project-specific NEPA for solar facilities within these SEZs. BLM notes TNC Area 2 overlaps a CPW priority area, two sites recommended by Defenders of Wildlife, and the southern portion of TWS Rio Grande site, as well as San Luis Valley Ecosystem Council Rio Grande Corridor (see Figure 2-28).

BLM recommended mitigation actions include land use planning designations, acquisition and habitat enhancement. The TNC area 2 site scored overall highest in the scored criteria categories of feasibility, effectiveness/additionality, and durability, and was considered to have a low comparative risk of failure for the compensatory mitigation actions because it lies mainly within areas of BLM jurisdiction and because it is not an Urban-Wildland interface area. BLM added bonus points to the preliminary score based on additional protection that would be provided to the Rio Grande River by the compensatory mitigation, and because the site links the Rio Grande del Norte National Monument (including an Audubon Important Bird Area) to the Rio Grande Natural Area. The top scored Hispano Cultural Landscapes site(s) may also afford, in addition to cultural resource and heritage mapping defined in Table 2-10, additional opportunity for visual resource mitigation, National Heritage Area interpretation, dust abatement activities, and illegal trash dump clean-up actions as environmental justice compensation offset. BLM notes that residual impacts to Antonito Southeast and Los Mogotes playa wetlands, migratory bird flyway, and visual resource offset options are poorly represented by top scoring sites and recommends the Closed Basin and Cumbres-Toltec mitigation sites for project-level NEPA range of development.

The top scoring compensatory mitigation sites for the De Tilla Gulch SEZ in the candidate site matrix were the Poncha Pass site, the Trickle Mountain-Saguache Creek site, and the Sangres Foothills site (all proposed by the BLM[19]), and the De Tilla Gulch Area 4 proposed by TNC (see Figure 2-30). These sites are recommended as priority sites for evaluation in future project-specific NEPA for solar facilities within these SEZs. The area of the top scoring site, the Poncha Pass site, was also proposed by CPW and the San Luis Valley Ecosystem Council (see Figure 2-28). BLM recommended mitigation actions are to: consider ACEC designation in an RMP amendment, install wildlife friendly fencing; develop wildlife water enhancements (i.e. stock tanks, spring enhancements); establish mitigation/conservation banks land acquisition/easements; conduct riparian and upland habitat restoration; and install fence and power line avian collision deterrents and/or buried power lines. The site scored high in the scored criteria categories of feasibility, effectiveness/additionality, and durability, and was considered to have a moderate comparative risk of failure for the compensatory mitigation actions due to easy installation of wildlife friendly fencing but possible future increased recreational use and increased population. Bonus points were added to the preliminary score based on additional protection that would be provided for Gunnison's sage grouse occupied habitat.

[19] The De Tilla Gulch Area 3 recommended by TNC is essentially the same as the Sangres Foothills site recommended by the BLM.

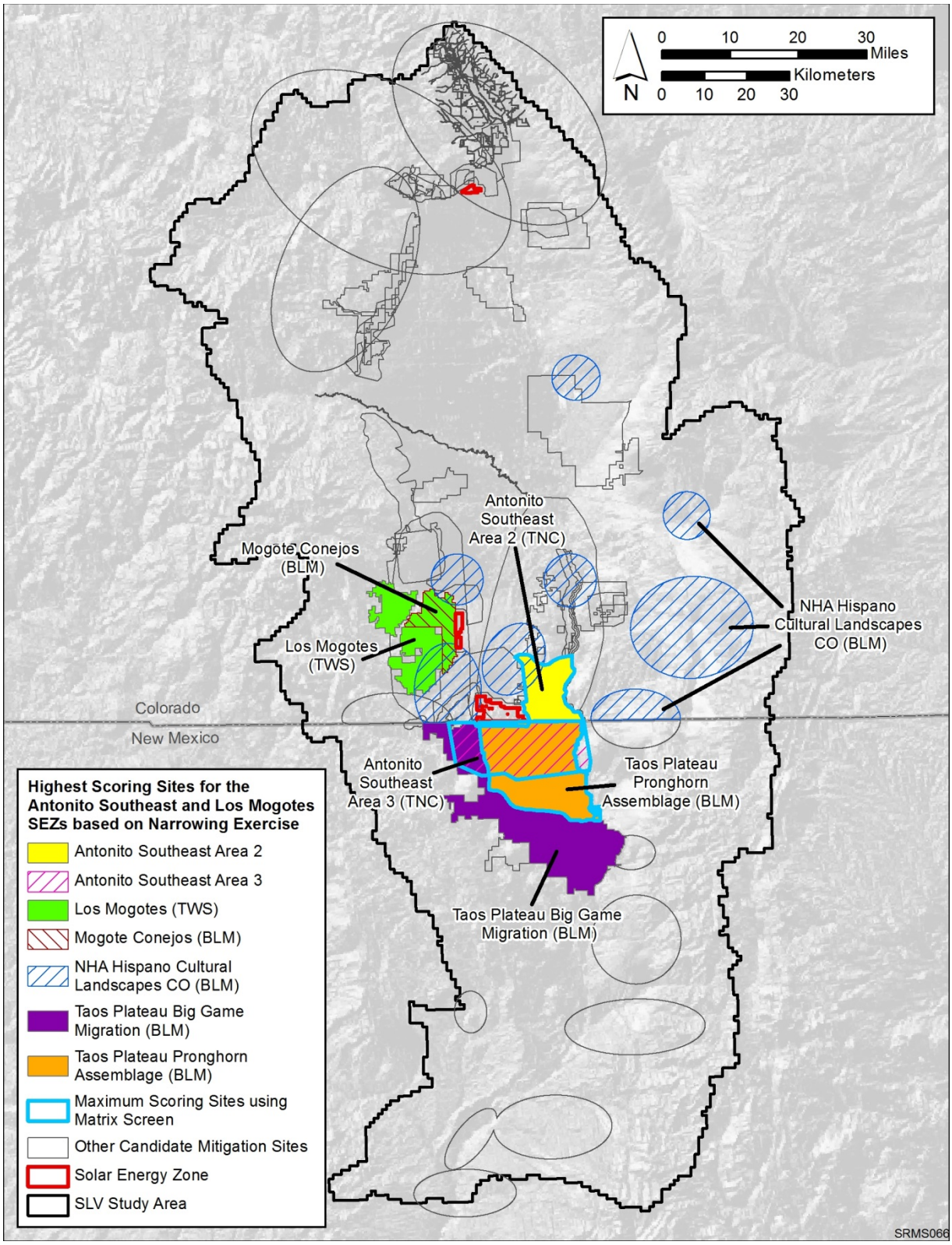


Figure 2-29. Top Recommended Compensatory Mitigation Sites for the Antonito Southeast and Los Mogotes SEZs

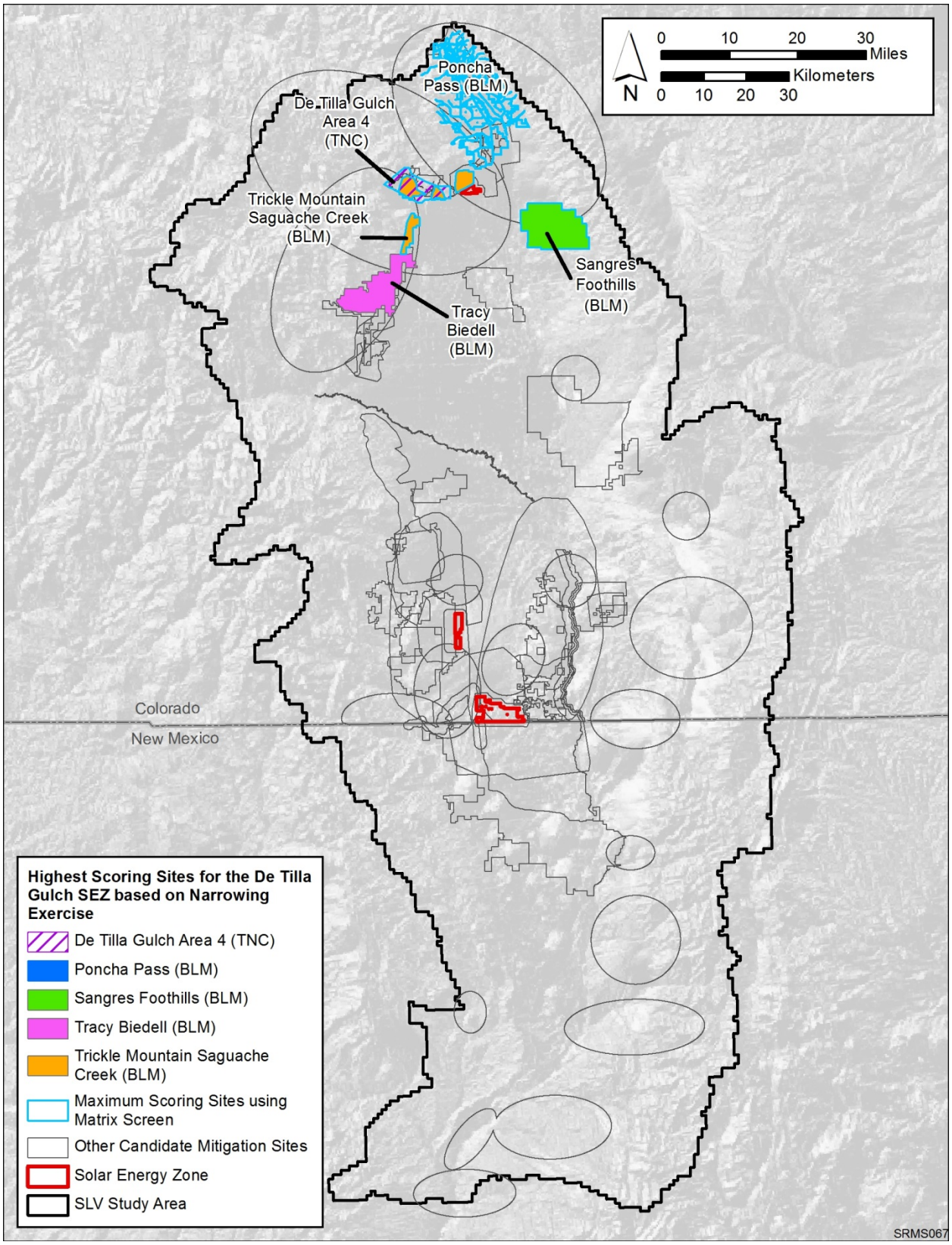


Figure 2-30. Top Recommended Compensatory Mitigation Sites for the De Tilla Gulch SEZ

Table 2-14 identifies preliminary costs estimates for some possible mitigation actions, based on restoration work done in the San Luis Valley-Taos Plateau study area, and on IDT knowledge of such costs from ongoing projects. These preliminary costs are provided simply as information to help guide future decisions on which mitigation actions would be most cost-effective.

Additional potential mitigation sites and actions have been identified to address impacts to visually sensitive areas that warrant mitigation that were identified in a Visual Impact Assessment for the SEZs (see Section 2.4.4.3 and Sullivan et al. 2016). Specially designated areas within the viewsheds of the visually sensitive areas warranting mitigation (i.e., Cumbres & Toltec Scenic Railway, the Rio Grande del Norte NM, U.S. 285, and the tribally important areas) would be desirable mitigation sites, because they are also major tourist destinations (Cumbres & Toltec Scenic Railway, Rio Grande del Norte NM), where viewer expectations for high scenic quality are high. If carefully chosen, mitigation actions could mitigate for visual impacts to more than one of the visually sensitive areas, and benefit other impacted sensitive areas (as described in the Visual Impact Assessment), and could overlap substantially with mitigation sites chosen for ecological and/cultural reasons as well.

Additional mitigation actions were also proposed in comments received on the Draft SRMS, including protection and enhancement of the viewshed along the Old Spanish National Historic Trail. Also, it was suggested that areas including lands with wilderness characteristics be prioritized as mitigation locations. These additional recommendations on mitigation sites and actions will be considered in conjunction with any project-specific NEPA that identifies specific visual, cultural, or land with wilderness characteristics resource impacts warranting mitigation.

The potential mitigation sites identified in this SRMS may be protected from degradation through RMP amendments in the future. However, such planning decisions are beyond the scope of this SRMS. When actual mitigation locations are selected, the BLM may provide additional durability for those locations through additional land use authorizations including rights-of-way, permits, leases, or easements, for example as detailed in an agreement between the BLM and the California Department of Fish and Wildlife (BLM and CDFW 2015).

2.9 Mitigation Effectiveness Monitoring and Adaptive Management Plan

In the Solar PEIS ROD, the BLM committed to developing and incorporating a monitoring and adaptive management plan into its solar energy program. The BLM "Assessment, Inventory, and Monitoring Strategy for Integrated Renewable Resources Management" (AIM Strategy) (Toevs et al. 2011) will guide the development of a Colorado Solar Energy Zone monitoring plan that will inform management questions at multiple scales of inquiry (e.g., the region/landscape, mitigation area, and project area). Detailed information about how the AIM Strategy will be implemented to support long-term monitoring of solar development is provided in Appendix A, Section A.2.4 of the Final Solar PEIS. This monitoring plan will also be consistent with and complement the BLM regional and national monitoring activities.

2.9.1 Established AIM Monitoring in the San Luis Valley

During the 2015 field season, a sampling crew completed assessments for 77 new AIM monitoring plots in the San Luis Valley that crossed 8 ecological strata, 49 grazing allotments, the three SEZs evaluated in this SRMS, and Poncha Pass Gunnison Sage-Grouse habitat (Billings and Cole 2016). Six plots were assessed in the Antonito Southeast SEZ, and 4 each in the De Tilla Gulch and Los Mogotes

Table 2-14. Preliminary Cost Estimates for Restoration Actions

Mitigation Measure	Cost	Agency-Proponent	Source	Project
Aerial seeding of sagebrush in Idaho	$13.63/acre	BLM	BLM Idaho	Various Projects (2011)
Fuel vegetation treatment	$250-300/acre	BLM	BLM Colorado	Various Projects (2015)
Pave unpaved roads and unpaved parking areas (99% control efficiency)	$44,100/mile-year (useful life of 25 years)		California Air Quality Management District 2006	Various Projects
Apply chemical dust suppressant annually (84% control efficiency)	$5,340/acre-year (useful life of 1 year)		California Air Quality Management District 2006	Various Projects
Voluntary community development fund	$500-800/acre (for Iberdrola facility used $800/acre; $50,000 total)	Alamosa County	Alamosa County – Iberdrola 30 MW Decommissioning and Community Development Agreement 2013	Various Projects 2010-2015
Mowing, disking, and drill seeding of rangeland (seed costs extra)	$100-200/acre	BLM	BLM New Mexico	Various Projects (2012-2015)
Seeding (including purchasing, collecting, and application)	$1,400/acre	BLM	BLM Dry Lake Valley North SRMS	
Weed Control in SLV	$112-600/acre	BLM, FS	BLM, FS weeds program	Various Weeds projects (2014)
Reclamation of Roads	$2,968/mile	University of Wyoming	University of Wyoming study	Various Projects (2009)
Trash Removal in SLV	$375/acre	BLM	BLM Realty	Various Trash cleanup projects (2014)
Construct Wildlife friendly fencing in SLV	$15-20,000/ mile	BLM	BLM Wildlife Biologist	Various projects (2013)
Sage Grouse Habitat Restoration, Enhancement, Protection and research in Nevada	$26.80/acre	BLM	BLM Range program	North Springs Valley Restoration (2009)
Pinion Juniper vegetation treatment in SLV	~$90.00/acre	BLM/FS	BLM Fire Program	Various Projects (2015)
Value of DIY mule deer hunt (One day)	$154 – in state $494 – out of state	BLM	BLM Recreation	
Value of guided mule deer hunt (5 day package)	$6,166 – in state $6,506 – out of state	BLM	BLM Recreation	

Table 2-14. (Cont.)

Mitigation Measure	Cost	Agency-Proponent	Source	Project
Kiosk for educational and interpretive information	$590/each for manufacture $300 per kiosk + $1 per mile from Monte Vista - installation	BLM	BLM Recreation	Various projects (2012-2015)
Educational and Interpretive signage	$1,050/ each layout and design $200/ each manufacture	BLM	BLM Recreation	Various projects (2012-2015)
Well Re-drill	$150,000 each	BLM	BLM Wetlands program	Various projects (2012-2015)
Wetlands Infrastructure work/project	$2500/each	BLM	BLM Wetlands program	Various projects (2012-2015)
Water acquisition/acre foot	$20,000-$25,000/acre foot	BLM	San Luis Valley realtors	Transaction records (2013-2015)
Water lease/acre foot	$100-$250/acre foot/year	BLM	BLM Wetlands program	Various projects (2012-2015)

East SEZs. AIM core indicator data were obtained for 18 samples from each plot using the four core AIM methods (line-point intercept with plot-level species inventory, vegetation height, gap intercept, and soil stability).

Ongoing monitoring of these locations within the SEZs and within the broader region is planned. These data should be used as baseline data to the extent possible when evaluating development impacts and the effectiveness of future mitigation actions.

2.9.2 Steps in Identifying a Mitigation Effectiveness Monitoring Plan

In the context of solar energy development, long-term monitoring should be conducted to (1) evaluate the effectiveness of mitigation measures, including avoidance measures, onsite mitigation, and regional compensatory mitigation; (2) detect unanticipated direct and cumulative impacts at the project and regional level; and (3) evaluate the effectiveness of elements of the BLM's solar energy program (e.g., policies, design features). To ensure that investments in regional compensatory mitigation actions are effective and that regional compensatory mitigation goals and outcomes are being met, it is critical that the long-term monitoring plan include monitoring outcomes specific to the regional compensatory mitigation sites and actions. The findings of the long-term monitoring activities will be examined by the BLM to support adaptive management of solar development (i.e., to identify the need to adjust operational parameters, modify mitigation measures, and/or implement new mitigation to prevent or minimize further impacts). The following steps will be conducted to develop the mitigation effectiveness monitoring plan for the Colorado SEZs:

Step 1. Developed Management Questions and Monitoring Goals.

The BLM IDT has developed management questions to articulate the issues of concern related to monitoring mitigation effectiveness. The management questions provide the basis for developing monitoring goals. The management questions and monitoring goals for the Colorado SEZs are provided in the two text boxes that follow.

Management Questions Established for the Colorado Solar Regional Mitigation Strategy

1. Were the design features of the solar development effective to contain the impact of solar installation to the project site (e.g., trend of attributes, special status species habitat indicators, invasive species, habitat metrics)?
2. Are the avoidance areas maintaining ecological composition and process similar to those adjacent to the project area?
3. Are the avoidance areas for cultural resources sufficient to protect their values from unintended or unanticipated adverse effects?
4. Did the regional compensatory mitigation actions achieve their outcomes?
5. Were the Colorado Solar Energy Zones (SEZs) mitigation actions, collectively, effective in improving the trend of landscape health metrics
6. What is the status and trend of landscape health metrics for critical ecological processes necessary to sustain the San Luis Valley—Taos Plateau ecosystem at two scales: the Colorado SEZs 2-mile buffer area(s), and the compensatory mitigation area(s)? (Note: Some impacts may need to be assessed at different distances (e.g., watershed, airshed).

Monitoring Goals Established for the Colorado Solar Regional Mitigation Strategy

1. **Establish** baseline measurements of rangeland health and landscape pattern. (Contributes to answer to MQ 1, 2, 4, and 5)

2. Establish baseline measurements for cultural resources values and determine the status and trend of these values once the permitted activity and related mitigation actions have been implemented. (Contributes to answer to MQ 1, 3, and 4)

3. Determine the status, condition, and trend of priority resources and landscape health metrics once the permitted activity and related mitigation actions have been implemented. (Contributes to answer to MQ 5)

4. Leverage the quantitative data from goals 1, 2, and 3 to map the location, amount, and spatial pattern of priority resources and disturbances. (Contributes to answer to all MQs)

5. Generate quantitative and spatial data to address goals 1 and 3 and to contribute to existing land health assessment and evaluation processes at multiple scales of inquiry. (Contributes to answer to MQ 6)

6. Generate quantitative and spatial data to determine if management actions (e.g., stipulations, land treatments) are moving resources toward desired states, conditions, or specific resource objectives identified in planning or related documents or legal mandates. (Contributes to answer to all MQs)

7. Use the collected data to validate and refine the conceptual understanding of key ecosystem components, processes, and sustainability concepts for the San Luis Valley – Taos Plateau ecoregion and the Colorado SEZs. (Contributes to answer to MQ 6)

Step 2. Identify Measureable Monitoring Outcomes and Indicators.

Measureable monitoring outcomes will be established for each monitoring goal identified in Step 1. Outcome setting will be based on current regulatory requirements, RMP goals, or the desired future condition consistent with the land potential (as described in the ecological site description, if available – see Step 4). Examples of measureable monitoring outcomes are provided in the text box titled Measureable Monitoring Outcome Examples.

Measureable Monitoring Outcomes Examples

Examples of a measureable outcome for land status/trend of vegetation are:

(1) Detect a difference of 10 percentage points in the average amount of bare ground in the <MITIGATION SITE> over a 5-year period with 80% confidence.

(2) Determine whether at least 25% perennial grass cover in the <MITIGATION SITE> has been maintained with 90% confidence.

An example of an outcome for cultural resource values is:

Detect any unanticipated impacts attributable to development-related changes in natural processes (e.g. erosion, vegetation growth or removal) or human effects (e.g., trampling, casual collection, vandalism) associated with increased project-related access.

Outcome setting includes specifying the attribute and measurable indicators of those attributes to be monitored. Monitoring outcomes will indicate the allowable amount of change (specific), and confidence level for the measured change (measurable), relationship to the management question (relevant), and timeframe during which the measurement occurs to effectively inform management (time sensitive).

Indicator selection will start with the standard AIM core and contingent quantitative indicators (MacKinnon et al. 2011) and supplement with additional indicators derived from ecosystem conceptual models and/or linked to specific management questions. The AIM core indicators and methods provide high-quality, quantitative information on all land cover types the BLM manages (MacKinnon et al. 2011). Table 2-15 (reproduced from MacKinnon et al. [2011]) lists each method and the corresponding indicators it measures, and the table describes recommendations to achieve consistent implementation across the BLM. When an ecological site at a monitoring site is identified, the BLM core measurements can be assessed in concert with information contained in the ecological site descriptions and the accompanying state and transition model to ascertain departure from an expected reference condition. The methodology for this assessment is contained in "Interpreting Indicators of Rangeland Health," BLM Technical Reference 1734-6 (Pellant et al. 2005). Table 2-16 is a summary table from this technical reference.[20]

In addition to the BLM core indicators, the design features for the Solar PEIS indicate that the BLM will consider requiring dust and noise monitoring as a leasing stipulation for the Colorado SEZs (BLM 2012). The developer's proposal will be reviewed by the BLM monitoring team to evaluate the efficacy of the proposal in complying with permit stipulations and informing BLM regulatory and land management needs.

[20] Tables 2-14 and 2-15 summarize guidance for BLM monitoring that may change over time; the most current versions of these guidance documents should be utilized at the time the monitoring program for the Colorado SEZs is established.

Table 2-15. Recommended Methods and Measurements for Core and Contingent Indicators (reproduced from MacKinnon et al. (2011))

Method	Indicator(s)	Description
For core indicators		
Line-point intercept with plot-level species inventory	• Bare ground • Vegetation composition • Nonnative invasive species • Plant species of management concern	Line-point intercept (LPI) is a rapid and accurate method for quantifying cover of vegetation and bare ground. Because LPI can underestimate cover of uncommon species, this method is supplemented with searches of a 150-ft (45.7-m) diameter standard plot for at least 15 minutes and until new species detections are more than 2 minutes apart. When performing LPI within tree cover, a modified pin method (e.g., a pivot-table laser or extendable pin) will be used to capture overstory cover.
Vegetation height measurement	• Vegetation height	Measure height of tallest leaf or stem of woody and herbaceous vegetation (living or dead) within a 6-in (15-cm) radius recorded for points along a transect. If vegetation is taller than 10 ft, a standard tape and clinometer method should be used to estimate vegetation height.
Canopy gap intercept	• Proportion of soil surface in large intercanopy gaps	Canopy gap intercept measures the proportion of a line covered by large gaps between plant canopies and is an important indicator of the potential for erosion. Use 1-ft (30-cm) minimum gaps.
For contingent indicators		
Soil stability test	• Soil aggregate stability	This test measures the soil's stability when exposed to rapid wetting and provides information on integrity of soil aggregates, degree of structural development, resistance to erosion, and soil biotic integrity.
Soil sample collection and analysis	• Significant accumulation of soil toxins	The presence and concentrations of toxins are assessed by collecting three samples from the soil surface and one sample at depths of 0 to 4 in (0 to 10 cm) and 4 to 8 in (10 to 20 cm) using a soil corer and following Forest Inventory and Analysis protocol.

Table 2-16. Quantitative Indicators and Measurements Relevant to Each of the Three Rangeland Health Attributes (reproduced from Pellant et al. (2005))

Attribute	Qualitative Assessment Indicator	Quantitative Measurement	Key Quantitative Assessment Indicator
Soil/site stability	• Rills • Water flow patterns • Pedestals and/or terracettes • Bare ground • Gullies • Wind-scoured, blowout, and/or depositional areas • Litter movement • Soil surface resistance to erosion • Soil surface loss or degradation • Compaction layer	Line-point intercept	Bare ground
		Canopy gap intercept	Proportion of soil surface covered by canopy gaps longer than a defined minimum
		Soil stability test	Soil macro-aggregate stability in water
Hydrologic function	• Rills • Water flow patterns • Pedestals and/or terracettes • Bare ground • Gullies • Soil surface resistance to erosion • Soil surface loss or degradation • Plant community composition and distribution relative to infiltration and runoff • Compaction layer • Litter amount	Line-point intercept	Bare ground
		Canopy gap intercept	Proportion of soil surface covered by canopy gaps longer than a defined minimum
		Soil stability test	Soil macro-aggregate stability in water
Biotic integrity	• Soil surface resistance to erosion • Soil surface loss or degradation • Compaction layer • Functional/structural groups • Plant mortality/decadence • Litter amount • Annual production • Invasive plants • Reproductive capability of perennial plants	Soil stability test	Soil macro-aggregate stability in water
		Line-point intercept	Plant canopy (foliar) cover by functional group
		Line-point intercept	Plant basal cover by functional group
		Line-point intercept	Litter cover
		Line-point intercept	Invasive plant cover

Special Status Plant Species Monitoring. The BLM will consider requiring the developer to conduct long-term monitoring on special status plant populations found on the project site and located in the same geographic region for the length of the duration of the impact. A special status plant species monitoring plan will be designed to determine the status, trend, and recruitment success of the populations and will follow methods described in BLM Technical Reference 1730-1, "Measuring and Monitoring Plant Populations" (Elzinga, Salzer, and Willoughby 1998).

Step 3. Develop Sampling Schema.

Based on the management questions, monitoring goals, measurable outcomes, and the indicators developed in Steps 1 and 2, the BLM IDT will determine the temporal and spatial scale of data collection activities. To develop the sampling schema, the following work will be conducted:

Develop a Statistically Valid and Scalable Sampling Design. Ecological sites are areas of land with the potential to produce similar types and amounts of vegetation based on soils and climate, and are the basic units for stratifying landscapes for BLM monitoring activities. Because ecological site descriptions describe the ecological states (plant communities) that can occur within the ecological site and can provide expected indicator values for reference states, they are the foundation upon which BLM monitoring data are evaluated. These data are also fundamental for terrestrial upland land health standards and land health evaluations. Where ecological site descriptions have not been developed, land potential metrics can be developed using a combination of field and remote sensing data to describe current and potential future conditions at broad scales.

Incorporate Status and Trend Monitoring. The monitoring locations are determined through a statistically based (i.e., randomized) selection of monitoring sites. Once the monitoring extent (i.e., inference area) is determined for each scale, a stratified random technique will be used to select monitoring sites such that every location within the monitoring extent has a known and nonzero probability of being selected for sampling. Strata will be based on ecological sites (or groupings of sites with similar ecological characteristics) to allow for adequate representation of ecological characteristics and linear features (e.g., ephemeral washes). See Figures 2-31 through 2-33 for possible sampling schema of the Colorado SEZs including 2-mile buffer areas. Locations would be monitored in a manner consistent with the BLM's Assessment, Inventory, and Monitoring (AIM) Strategy (Toevs et al. 2011) in order to understand status and trends in monitored resources. This example sampling schema could also be applied to the candidate mitigation sites once site boundaries have been delineated.

Incorporate Monitoring of Effectiveness of Actions. The sampling schema for an implementation action follows the criterion from the previous paragraph, with the sample population based on the geospatial footprint of the project area and the addition of control sites to determine effectiveness of the action. Control sites are chosen outside of the action area based on similarity of soils and existing vegetation community in the action area. Control sites can be a selection from existing statistically valid monitoring efforts such as the long-term monitoring sites that are a part of the BLM Landscape Monitoring Framework.

To account for the variability among sites of similar potential, a minimum of three control sites are selected for each strata present in the treatment area. Sample sufficiency analysis will be conducted after the first year of sampling to examine indicator variability within each stratum to determine if additional sites are needed in the implementation action or control areas.

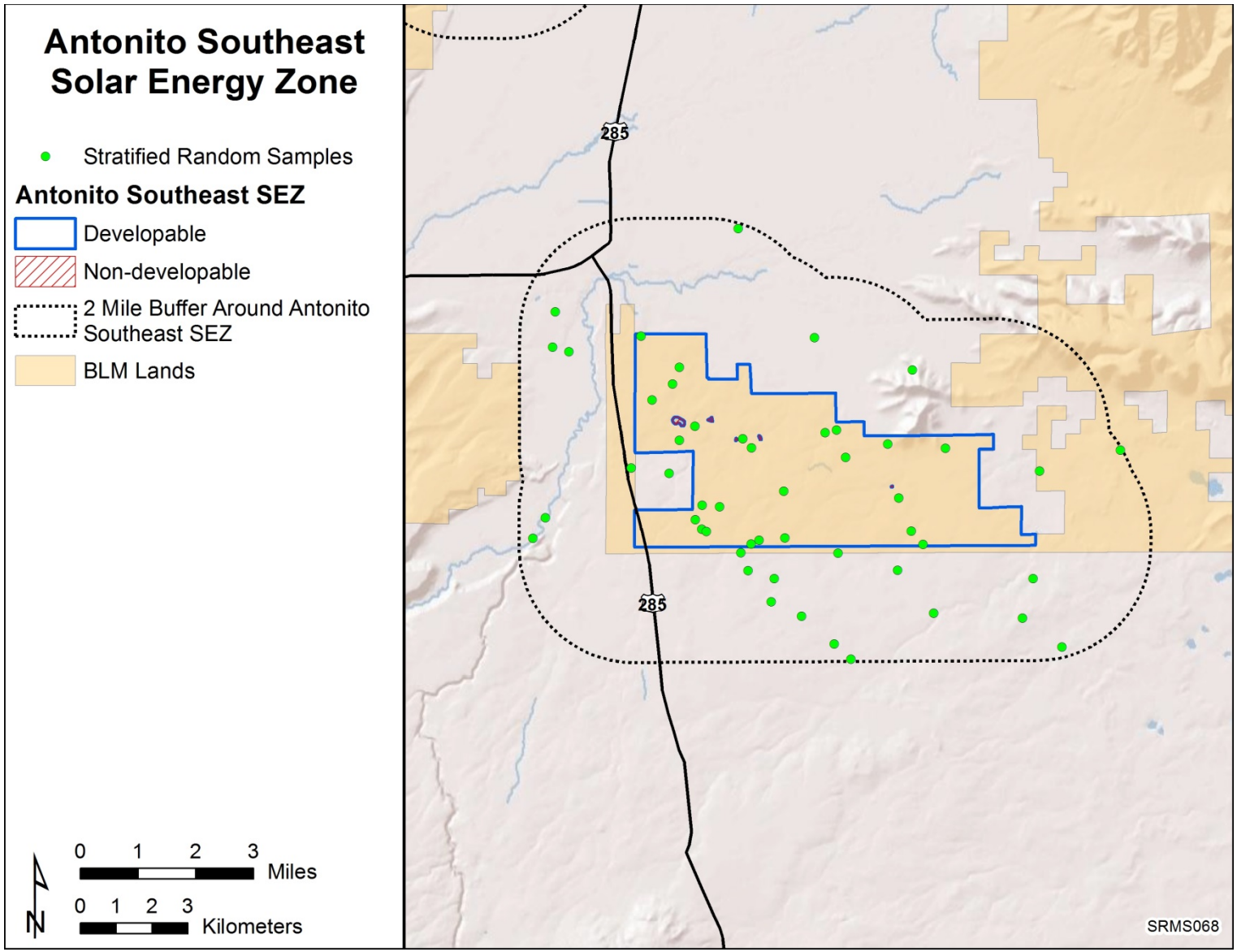


Figure 2-31. Example of a Stratified, Nonbiased Sampling Schema for the Antonito Southeast Solar Energy Zone

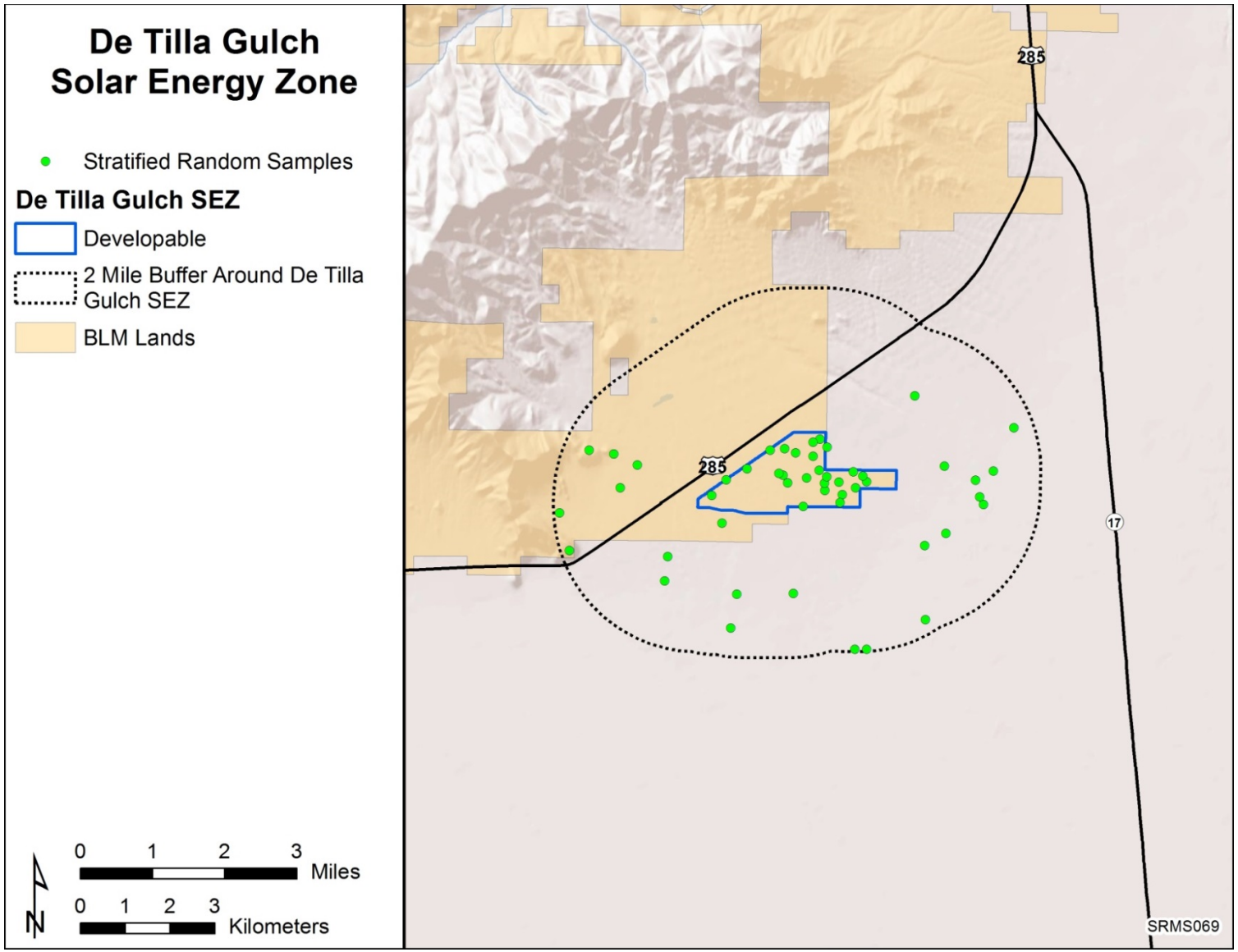


Figure 2-32. Example of a Stratified, Nonbiased Sampling Schema for the De Tilla Gulch Solar Energy Zone

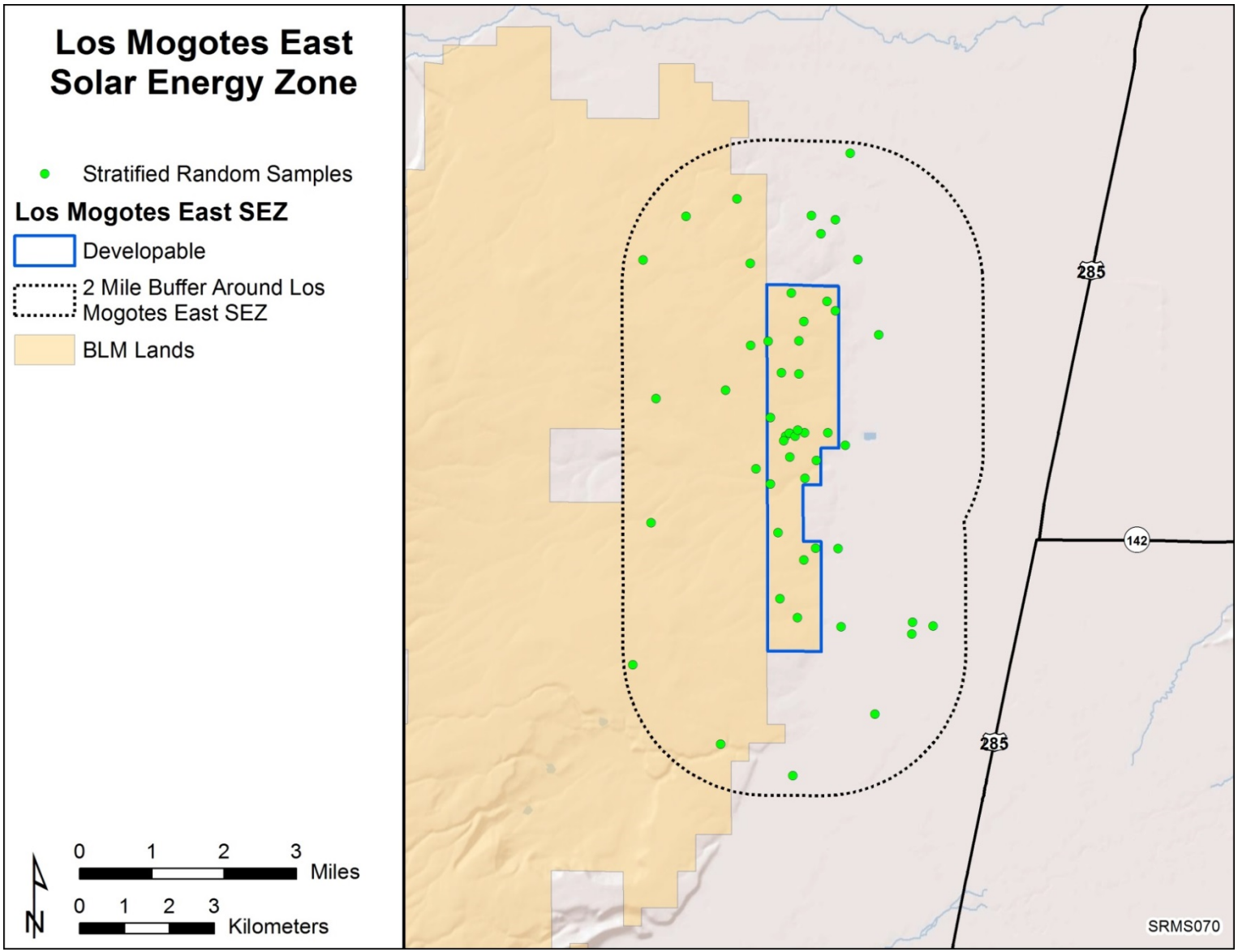


Figure 2-33. Example of a Stratified, Nonbiased Sampling Schema for the Los Mogotes East Solar Energy Zone

Integrate Remote Sensing Monitoring Technologies. Considerable work has been done to develop methodologies for processing and analyzing remote sensing data in order to extract information suitable for assessing changes in certain environmental conditions over time. The AIM Strategy emphasizes the value of integrating remote sensing technologies into long-term monitoring programs, wherever feasible, in order to provide cost-effective methods for collecting data and analyzing effects (Toevs et al. 2011).

Remote sensing technologies provide several benefits. They support the collection of spatially comprehensive datasets that are not otherwise readily available. In addition, the collection of data from a satellite or aircraft is nonintrusive, a very valuable feature for assessing ecologically and culturally sensitive areas. Semi-automated data processing of remotely sensed images can be a cost-effective way to reliably detect and identify features and quantify parameters over large areas more frequently. This feature is desirable for monitoring spatially heterogeneous and temporally dynamic arid and semiarid environments. Historic archives of remotely sensed data permit retrospective assessments and are thus suitable for long-term monitoring (Washington-Allen et al. 2006).

The limitations of remote sensing are that such measurements are indirect, and the spatial sampling unit (i.e., pixel) is arbitrary. In remote sensing, spectral reflectance signals from elements on the ground are assumed to be isolated from environmental and instrumental noise (Stow 1995). Further, targets are assumed to be spectrally separable from background, and different target types are assumed to have unique spectral signatures (Friedl, McGwire, and McIver 2001). The BLM IDT should consult the AIM Strategy guidance and remote sensing experts to investigate cost-effective ways to incorporate the use of remote sensing technologies into the monitoring of mitigation actions.

Step 4. Develop Analysis and Reporting System.

Interpreting the data to determine the status, departure, or rate of change requires comparison of data collected via field sampling and/or remote sensing against indicators of ecological attributes for reference conditions. These reference conditions will be based on site or landscape potential which is described in ecological site descriptions or documented through reference sites. Ecological sites, or groupings of sites with similar ecological characteristics, are the basis for the monitoring schema because they react similarly to factors like disturbance or degradation (historic or current), which can lead to alternative stable plant communities outside the historic potential of the site. For this reason, ecological groupings are a basic unit for analysis and reporting. Elements of an ecological description that are helpful for defining reference conditions and interpreting departure from reference conditions include: state-and-transition conceptual models of plant community changes in response to disturbance or management; descriptions of the range of plant communities that could exist on the site in addition to the potential vegetation; descriptions of anthropogenic and natural disturbances and their potential to cause changes in plant communities; descriptions of dynamic soil properties (e.g., organic matter content, soil aggregate stability); and amount of bare ground. Report frequency will be established at the time the mitigation and monitoring actions are selected. Reports would be made publicly available through various media (e.g., available on public websites).

Step 5. Define Adaptive Management Approach.

The BLM will use information derived from the Colorado monitoring plan to determine if resource management objectives described in the San Luis Valley RMP—the Colorado SEZs, the 2-mile buffer zone around each SEZ, and the areas where regional compensatory mitigation actions will occur—are being met. If the objectives are not being met, the monitoring program information will be

used to make necessary management adjustments to the mitigation actions. Reporting at multiple scales will inform decision makers on the effectiveness of management and mitigation actions, opportunities for adaptive management (e.g., adjusting operational parameters, modifying mitigation actions, and/or adding new mitigation actions), refinement of conceptual models, and evaluation of the monitoring program itself. Adaptive changes will be subject to environmental analysis, land use planning, and public involvement, as appropriate.

2.10 Implementation Strategy

This SRMS considered impacts that are likely to occur with the full build-out of each of the Colorado SEZs identified in the Solar PEIS ROD. The IDT found that while many potential impacts can be avoided and/or minimized, several residual impacts are likely to remain and may warrant compensatory mitigation as listed in Section 2.4.3.2.

Any authorized mitigation activities are intended to provide mitigation through the duration of the impacts, which is assumed to be over a range of 40 to 60 years for purposes of this SRMS. The mitigation sites and actions selected in conjunction with project-specific NEPA should offset anticipated impacts of solar development in the Colorado SEZs while allowing the BLM to sustain the yield of impacted resources for present and future generations.

Stakeholders will be informed of potential development in any of the Colorado SEZs (such as competitive auctions for any of the SEZs, and opportunities for review of environmental assessments and compensatory mitigation implementation plans for projects within SEZs) through public notices in public media and through emails. Additionally, the BLM will provide opportunities for stakeholders to track the effectiveness and progress of selected mitigation actions over time (for example, through periodic monitoring reports and public meetings or webinars). Detailed information on implementation of mitigation actions will be provided in an Implementation report such as was provided for the Dry Lake SEZ SRMS (BLM 2015).

The findings and recommendations offered in this SRMS are intended to inform the decision-making process associated with leasing land in the Colorado SEZs for utility-scale solar development. At the discretion of the BLM authorized officer, all or part of these recommendations should be included in applicable NEPA analyses and the decision-making process.

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4 GLOSSARY

***Adaptive management*:** a system of management practices based on clearly identified outcomes and monitoring to determine whether management actions are meeting desired outcomes; and, if not, facilitating management changes that will best ensure that outcomes are met or re-evaluated. Adaptive management recognizes that knowledge about natural resource systems is sometimes uncertain.

***Additionality*:** improves the baseline conditions of the impacted resource, and is demonstrably new and would not have occurred without the compensatory mitigation measure.

***Avoidance*:** avoiding the impact altogether by not taking a certain action or parts of an action (40 CFR 1508.20(a)).

***Baseline*:** the pre-existing condition of a resource, at all relevant scales, which can be quantified by an appropriate attribute(s). During environmental reviews, the baseline is considered the affected environment that exists absent the project's implementation, and is used to compare predictions of the effects of the proposed action or a reasonable range of alternatives.

***Best management practices (BMPs)*:** state-of-the-art, efficient, effective, and practicable mitigation measures for avoiding, minimizing, rectifying, and reducing or eliminating impacts over time. BMPs for solar development in Colorado are identified in BLM's Solar Energy Program (i.e., the Solar PEIS ROD, also called the Western Solar Plan).

***Change agents*:** an environmental phenomena or human activity that can alter or influence the future condition and/or trend of a resource. Some change agents (e.g., roads) are the result of direct human actions or influence; others (e.g., climate change, wildland fire, and invasive species) may involve natural phenomena or be partially or indirectly related to human activities.

Coarse filter: elements such as vegetation communities, ecosystems, or land classes for planning and management across landscape- and regional-level management units.

***Compensation*:** compensating for the impact by replacing or providing substitute resources or environments (40 CFR 1508.20(e)).

***Compensatory mitigation action*:** an activity, process, or measure that may include restoration, establishment, enhancement, and preservation of resources offsetting residual effects.

***Compensatory mitigation obligation*:** the compensatory mitigation measures required by the BLM to mitigate residual effects to resources from a land use activity, or fees paid to BLM or other entities to be used to mitigate residual effects to resources from a land use activity.

***Compensatory mitigation site*:** the areas where compensatory mitigation measures are located.

Conservation elements: resources with regional conservation importance, including: species, species assemblages, ecological systems, habitats, physical resources (e.g., air, soils, hydrology), cultural resources, and visual resources.

Design features: required measures or procedures incorporated into the proposed action or alternatives which could avoid, minimize, mitigate, or otherwise reduce adverse impacts of a project proposal. Design features for solar development in Colorado are identified in BLM's Solar PEIS ROD, also called the Western Solar Plan.

***Durability*:** a state in which the measurable environmental benefits of mitigation will be sustained, at minimum, for as long as the associated harmful impacts of the authorized activity continue. The "durability" of a mitigation measure is influenced by: (1) the level of protection or type of designation provided; and (2) financial and long-term management commitments.

***Duration of the impact*:** the temporal extent of resource impacts resulting from permitted actions. The duration of some impacts may be indefinite or perpetual.

Ecosystem: a dynamic complex of plans, animals, microorganisms, and the nonliving environment which interact as a functional unit.

Ecosystem functions: the processes through which ecosystems sustain themselves. Ecosystem functions result in ecosystem services.

Ecosystem services: the benefits that humans receive from ecosystems. Humans use ecosystems, and thus receive value from ecosystem services, in diverse ways. Some values generated by ecosystem services are directly tied to market activity, such as timber, raw materials, food, and fuel. Other values generated by ecosystem services may be only indirectly tied to market activity, or may not have any ties to market activity. Values of goods and services that fall outside of market activity are called non-market values by economists.

***Effective*:** produces the desired outcome.

***Effects*:** the adverse direct, indirect, and cumulative impacts from a land use activity; effects and impacts as used in this document are synonymous.

***Enhancement*:** the manipulation of resources to heighten, intensify, or improve a specific resource.

Fine filter: meant to complement the coarse filter by targeting species with requirements that will not be met through the broad brush of dominant vegetation communities—rare, threatened or endangered species, wildlife species of management interest, or those species that consistently use ecotones or multiple habitats on a diurnal or seasonal basis.

Goal (regional goal or land use plan goal): a broad statement of a desired outcome. Goals are usually not quantifiable and may not have established time frames for achievement.

***Impacts*:** the adverse direct, indirect, and cumulative effects from a land use activity; effects and impacts as used in this document are synonymous.

***Landscape*:** a geographic area encompassing an interacting mosaic of ecosystems and human systems that is characterized by a set of common management concerns. The landscape is not defined by the size of the area, but rather by the interacting elements that are relevant and meaningful in a management context.

***Minimization*:** minimizing impacts by limiting the degree or magnitude of the action and its implementation (40 CFR 1508.20(b)).

***Mitigation*:** includes, avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or 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 (40 CFR 1508.20).

***Mitigation Desired Outcome*:** a clearly-defined and measurable result of a compensatory mitigation action.

***Mitigation fund (i.e., an in-lieu fee fund)*:** an arrangement, facilitated by a sponsor, where resources are restored, established, enhanced, and/or preserved, by pooling and spending funds from a single or multiple authorized land users, for the purpose of compensating for residual effects to resources from land use activities. In general, a mitigation fund accepts funds for compensatory mitigation from authorized land users, whose obligation to provide compensatory mitigation is then transferred to the mitigation fund sponsor.

***Mitigation hierarchy*:** see *Mitigation*, the process and order of preference for the application of mitigation, i.e., avoidance, minimization, remediation, reduction over time, and/or compensation, in order.

***Mitigation Strategy*:** a document that identifies, evaluates, and communicates potential mitigation needs and mitigation measures in a geographic area, at relevant scales, in advance of anticipated land use activities.

***NEPA process/analysis*:** analysis prepared pursuant to the National Environmental Policy Act, such as a planning- or project-level environmental assessment (EA) or environmental impact statement (EIS).

***No net loss*:** when mitigation results in no negative change to baseline conditions (e.g. fully offset or balanced).

***Objective (regional objective or land use plan objective)*:** a description of a desired for a resource in a land use plan. Objectives can be quantified and measured and, where possible, have established time frames for achievement.

***Onsite Mitigation*:** mitigation implemented in the project area.

Operations and Maintenance: a budgeting term including costs of operation and maintenance of, for example, a mitigation feature.

***Preservation*:** the removal of a threat to, or preventing the decline of, resources. Preservation may include the application of new protective designations on previously unprotected land or the relinquishment or restraint of a lawful use that adversely impacts resources.

***Proponent-responsible compensatory mitigation*:** resources that are restored, established, enhanced, and/or preserved, by an authorized land user (or an authorized agent or contractor), for the purpose of compensating for residual effects to resources from land use activities.

***Residual impacts*:** any adverse reasonably foreseeable effects that remain after the application of the first four steps in the mitigation hierarchy; also referred to as unavoidable impacts.

Resources: see Resources (and their values, services, and/or functions).

Resources (and their values, services, and/or functions)*: *resources are natural, social, or cultural objects or qualities; ***resource values*** are the importance, worth, or usefulness of resources; ***resource services*** are the benefits people derive from resources; and ***resource functions*** are the physical, chemical, and/or biological processes that involve resources.

***Restoration*:** the manipulation of degraded resources in order to return the resources to an un-degraded condition.

APPENDIX A

BLM Colorado-New Mexico Summary of Resource Impacts for Colorado Solar Energy Zones

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BLM Colorado-New Mexico Summary of Resource Impacts (Includes Degree of Onsite Mitigation and Recommendations for Project-level NEPA Analysis, and Assessment of Residual impacts) for the Antonito Southeast Solar Energy Zone

Location: Southeast Conejos County, Colorado, BLM San Luis Valley Field Office - 9,712 developable acres, 17-acre wetland and lake non-development area; up to 1,554 MW generation capacity. Sources: Summarized from Draft and Final Solar PEIS for the SEZ (http://blmsolar.anl.gov/sez/co/antonito-southeast/), with BLM Interdisciplinary Team (IDT) Input.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Acoustics Section 10.1.15[4]	Direct: Increased noise levels during construction and operation of solar facilities with thermal energy storage could cause noise levels slightly exceeding the EPA guideline of 55 dBA at the nearest residences (about 0.5 mi [0.8 km] to the north and west), particularly for activities near the northwestern boundary of the SEZ. The EPA guideline could also be exceeded at the West Fork of the North Branch of the Old Spanish Trail segment under study which is located as close as 660 ft (200 m) west of the SEZ. A level of 55 dBA is similar to the noise of an air conditioning unit at 100 ft. Noise impacts during operation of PV facilities would be minimal. Indirect: Based on Solar PEIS modeling, increased noise levels during construction and operations near the southwestern boundary are not expected to affect wildlife in the San Antonio WSA. Cumulative[5]: If multiple facilities were to be constructed close to the SEZ, residents and/or wildlife nearby could be affected by the noise generated, particularly at night when the noise is more discernible due to relatively low background levels. Data Gaps[6]: Impacts on wildlife from construction noise needs to be considered on a project-specific basis. Refined modeling and background measurements would be needed.	Programmatic design features include a requirement that projects will be designed to locate solar facilities far enough away from residences, or include engineering and/or operational methods, such that county, state, and/or federal regulations for noise are not exceeded. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Noise.pdf	Programmatic design features include a requirement to limit the hours of daily activities, construct noise barriers if needed and practicable, and coordinate with nearby residents. See other programmatic design features at URL under Avoidance column. <u>SRMS Project-level NEPA Recommendation: A-1</u> Evaluate construction timing restrictions in project-level NEPA alternatives to further minimize effects on wildlife (e.g., no construction during breeding season or in winter use concentration areas/critical winter range).	Maybe (for wildlife). Generally, impacts from solar development are expected to be temporary, localized, and readily mitigated onsite. Technology used and onsite mitigation implemented would be primary driver of residual impact for full build-out of SEZ.

[1] The residual or unavoidable impacts assessment assumes BLM-DOE Solar PEIS (ROD, 2012) analysis and 80% of the SEZ area will be used for solar development.

[2] These columns give examples of avoidance and minimization measures that are specified in the Record of Decision for the Final Solar PEIS and will be required. Additional avoidance and minimization measures proposed by the BLM IDT are listed (numbered for future reference) and should be evaluated through project-specific environmental analyses. Monitoring is planned to verify the implementation and effectiveness of avoidance and minimization measures.

[3] Residual or unavoidable impacts are residual effects that cannot be adequately mitigated onsite by avoidance and/or minimization. Preliminary assessments are provided for comment.

[4] Section numbers are the same in both the Draft and Final Solar PEIS.

[5] Sections 10.1.22.4 of the Draft and Final Solar PEIS address cumulative impacts, which consider ongoing and reasonably foreseeable activities in the vicinity of the SEZ such as wind, geothermal, mining, agricultural, and commercial development; new roads, traffic, and off-highway vehicle use; and infrastructure such as transmission lines and fences.

[6] Data gaps have not been identified for all resources in this table. Additional data gaps may be identified during future SEZ- or project-specific assessments.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Air Quality Section 10.1.13	Direct: Fugitive dust and equipment exhaust emissions during construction could result in short-term exceedance of National Ambient Air Quality Standards (NAAQS) for particulate matter (PM) in SEZ vicinity. Predicted 24-hour PM_{10} concentration levels could exceed the NAAQS at nearest residences in Antonito and Lobatos during exceptional spring wind events. The Prevention of Significant Deterioration increment at Wheeler Peak WA and Great Sand Dunes WA (Class I areas) could be exceeded. Disturbance of soils (particularly subsurface calcic soils) may produce construction-phase fugitive dust, particularly during exceptional wind events during spring, which may result in exposure to respirable particulates and/or microbes (human health impacts). Indirect: New SEZ source suspended PM could temporarily contribute to regional seasonal spikes in asthma and other respiratory ailments in a Colorado airshed with the highest proportion of low income and minority populations on a county basis. Decreased visibility in nearby residential (as close as 0.5 mi [0.8 km] to the north and west) or specially-designated areas due to elevated PM levels from soil disturbance/grading during construction. Increased PM would also increase dust-on-snow accumulation, possibly contributing to changed stream runoff patterns. If used for dust abatement, magnesium chloride could be harmful to plants (due to increased chloride ions in runoff). Cumulative: Los Mogotes East and Antonito Southeast SEZs are within ~ 12 mi (19 km) of each other. Construction of solar facilities at the two SEZs could have cumulative impacts with respect to generation of PM in a region of Colorado with monitored Max 24-hr PM10's exceeding PM10 NAAQS (peak concentration range ~140-600 mg/m2 (2002-2013, Chang et al. 2016). New SEZ dust sources would be cumulative to extensive fallow irrigated agricultural circles and unpaved roads with respect to generation of PM and associated public health impacts. Data Gaps: Monitoring for PM during all phases of development will be required to identify levels exceeding NAAQS.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Air_Quality_Climate.pdf SRMS Project-level NEPA Recommendations: SRMS AQ1: Explicitly compare design, construction, and operation measures in range of NEPA alternatives to evaluate on-site dust generation avoidance effectiveness. SRMS AQ2: Evaluate a range of NEPA alternatives, varying maintenance and/or restoration requirements (range = 50-90% baseline cover) of native vegetation and soil cobble with other dust abatement methods SRMS Recommended Project-Level NEPA SEZ Specific Design Features: SRMS AQC2-2: Avoid construction during times of high dust emissions from other sources (e.g., agricultural plots). SRMS AQC2-3: The SEZ solar project Vegetation Management Plan will quantify site baseline soil protective cover and set project construction and operation-phase ground-level wind surface friction control targets beneath and surrounding solar arrays to reduce dust generation.	Programmatic design features include a requirement to implement dust suppression measures during construction and operations. See other programmatic design features at URL under avoidance column. SRMS Project-level NEPA Recommendations SRMS-AQ3: Evaluate solar panel mounting and other disturbance minimizing technologies in project-level NEPA alternatives (e.g. no grading of the site, retention of maximum native vegetation, use of low emission vehicles, placing gravel on roads, use of "drive and crush" installation). SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS AQC2-4: SEZ Re-vegetation with native vegetation to increase soil stability as a plan of development feature to further minimize the amount of grading and surface disturbance and promote reduced dust emissions and PM levels.	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Climate Change Section 5.11.4 of DPEIS for soil storage capacity; 10.1.13 for emissions avoided	Direct: Possible impact through loss of carbon storage capacity of the soil (estimated at 100 g carbon/m^2). Preliminary calculations show loss of CO_2 storage capacity as 1.6 tons/acre/yr (12,431 tons/yr for SEZ full build-out), less than 1% of the CO_2 emissions avoided by operation of a solar facility (see below). Positive impact: Solar power generation reduces demand for energy from fossil fuels, and thereby reduces greenhouse gas emissions (from about 1,494,000-2,689,000 tons/yr CO_2 avoided at full build out depending on technology). Indirect: If PM is highly elevated and results in increased dust-on-snow accumulation effects of climate change may be exacerbated (through early and/or fast stream run-off coupled with decreased snowpack). Cumulative: Over the long term, the development of solar energy may contribute to reduced greenhouse gas emissions, if the development offsets electricity generation by fossil fuel plants). About 90% of electricity in CO is produced in fossil fuel plants. Data Gaps: None identified.	See programmatic design features for vegetation at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS AQC2-3: The SEZ solar project Vegetation Management Plan will quantify site baseline protective soil cover and set project construction and operation-phase ground-level wind surface friction control targets beneath and surrounding solar arrays to reduce dust generation.	See programmatic design features at URL under Avoidance column.	No. Impacts are likely to be positive. No mitigation likely needed.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Cultural Section 10.1.17	Direct: Visual impacts are likely on the Cumbres and Toltec Scenic Railroad (CTSR) National Historic Landmark. Impacts on the West Fork of the North Branch of the Old Spanish Trail segment under study are possible (see data gaps)/ Impacts on the Picuris Trail and the Chili Line are also possible within the SEZ. Indirect: Impacts on significant cultural resources and cultural landscapes associated with American Latino heritage, such as within the Sangre de Cristo National Heritage Area, are possible throughout the San Luis Valley. Impacts on significant cultural resources and cultural landscapes associated with Native American groups are also possible. Erosion impacts on the cultural landscape outside of the SEZ resulting from land disturbances and modified hydrologic patterns, increased accessibility and potential for damage to eligible sites outside of the SEZ (if present). Cumulative: Dependent on whether eligible sites are found and impacted in the SEZ and adjacent areas. Data Gaps: A pre-development cultural inventory and evaluation will be completed, as part of the Section 106 consultation process. The potential significance of the Taos Valley Canal, the stagecoach route, and other possible historic or indigenous trail segments should be investigated further to determine whether solar energy development would adversely affect these resources. Additional investigation of the location, integrity, and the significance of portions of the West Fork of the North Branch of the Old Spanish Trail segment under study from which future potential development in the SEZ could be viewed (which may include archival research, archaeological investigation, and viewshed analysis) is needed to determine whether adverse impacts on the Trail would occur.	Programmatic design features require that significant cultural resources clustered in specific areas which retain sufficient integrity will be avoided. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Cultural.pdf Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS-CR2-2: For projects located within the viewshed of the West Fork of the North Branch of the Old Spanish Trail segment under study, further study is needed, which may include archival research, archaeological investigation, and viewshed analysis, to determine the area of possible adverse impact on resources, qualities, values, and associated settings of the Trail; to identify measures to prevent substantial interference; and to determine and avoid any areas unsuitable for development.	Programmatic design features require that a Memorandum of Agreement be developed and executed if eligible sites are discovered within the SEZ, to determine how the eligible properties will be treated (avoided or mitigated to minimize impacts). See other programmatic design features at URL under Avoidance column. Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS-CR2-3: Additional coordination with the CTSR Commission and the National Park Service is recommended to address possible mitigation measures for reducing visual impacts on the CTSR National Historic Landmark.	Yes. The discovery of new cultural sites is always a possibility, and adequate mitigation would be dependent on the resources discovered and their relative significance in the region. Residual impacts to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and coordination with stakeholders (federal, state, and local agencies, tribes, and public). In addition, impacts on non-renewable resources are both irretrievable and irreversible.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Ecology: Vegetation and Riparian Areas Section 10.1.10	Direct: Development will adversely affect characteristic vegetation (e.g., big sagebrush, rubber rabbitbrush, winterfat, western wheatgrass, green needlegrass, and needle-and-thread) through destruction and loss of habitat. Development will result in moderate impacts to the following land types which comprise about 99% of the SEZ: Inter-Mountain Basins Semi-Desert Shrub Steppe (86%) and Inter-Mountain Basins Semi-Desert Grassland (13%). Sensitive habitats on the SEZ include wetlands, riparian areas, and ephemeral washes. Development, including vegetation removal, land clearing, grading, dust deposition, and lowered groundwater levels, may alter soils and vegetation communities. Indirect: There may be loss of native vegetation outside the SEZ due to dust deposition from construction and operations, increased surface water runoff and related erosion, or through the introduction of invasive species. Cumulative: Solar energy development could be a contributor to cumulative impacts on some vegetation communities, depending on the type, number, and location of other developments in the region. Data Gaps: None identified.	SEZ-specific programmatic design features require that all wetland and dry wash habitats within the SEZ be avoided to the extent practicable, and any impacts minimized and/or mitigated in consultation with appropriate agencies. A buffer area will be maintained around wetlands, dry washes, and riparian areas to reduce the potential for impacts on or near the SEZ and on riparian habitats associated with the Rio San Antonio, Rio de los Pinos, Conejos River, and Cove Lake Reservoir. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS ER2-2: The Vegetation Management Plan should include the maintenance of the maximum acreage of native vegetation cover practicable, and compliance with applicable regulations and policies for the control of noxious weeds and invasive plant species (e.g., travel through weed-infested areas will be avoided; weeds will be treated, vehicles and machinery will be cleaned to remove weed seeds), to maintain ecological integrity and decrease the probability of wildfires.	SEZ-specific programmatic design features require that appropriate engineering controls be used to minimize impacts on wetland, dry wash, and riparian habitats, including downstream occurrences, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls will be determined through agency consultation. See other programmatic design features at URL under Avoidance column. SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS ER2-3 Evaluate solar panel mounting and other disturbance minimizing technologies (e.g., no grading of the site) in project-level NEPA alternatives. SRMS ER2-4, If project-specific impacts to groundwater are identified, purchase of existing water rights must be used to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table.	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ. Development would result in direct removal or disturbance of native plant communities and the ecosystem services they provide. Many impacts to riparian areas can be mitigated onsite by avoiding development in riparian areas and by the installation of engineering controls on surface water runoff/erosion.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Ecology – Invasive and Noxious Weeds Section 10.1.10	Direct:. Development, including vegetation removal, land clearing, grading, dust deposition, and lowered groundwater levels, may alter soils and vegetation communities and result in the establishment of invasive species and noxious weeds within the SEZ. Some weeds of concern include henbane, whitetop, Russian napweed, and Canada thisle. Indirect: There may be loss of native vegetation outside the SEZ due to the introduction of invasive species. Establishment of noxious weeds in the SEZ may result in spread of weeds to adjacent areas. Cumulative: Solar energy development could be a contributor to cumulative impacts on some vegetation communities, depending on the type, number, and location of other developments in the region. Data Gaps: Colonization rates of weed species.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS ER2-2: The Vegetation Management Plan should include the maintenance of the maximum acreage of native vegetation cover practicable, and compliance with applicable regulations and policies for the control of noxious weeds and invasive plant species (e.g., travel through weed-infested areas will be avoided; weeds will be treated, vehicles and machinery will be cleaned to remove weed seeds), to maintain ecological integrity and decrease the probability of wildfires.	See programmatic design features at URL under Avoidance column. RMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS ER2-5: Conduct surveying and treating invasive weeds, including henbane, along access roads to the SEZ, and solar panel mounting and other disturbance minimizing technologies (e.g., no grading of the site) should be evaluated in project-level NEPA alternatives.	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ. Onsite mitigation will reduce, but not eliminate, the potential for invasive species establishment. The degree of disturbance creates a significant opportunity for the establishment of invasive species and weeds.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Ecology: Terrestrial Wildlife Section 10.1.11	Direct: Loss of habitat and connectivity for several species of amphibians, reptiles, birds, invertebrates, and mammals including big game species (black bear, bighorn sheep, cougar, elk, mule deer, and pronghorn). Ground disturbance, fugitive dust generated by project activities, noise, lighting, vegetation clearing, spread of invasive species, accidental spills, harassment, and ephemeral stream loss could impact wildlife within the SEZ, and may cause mortalities. Noise could particularly impact migrating elk herds. Indirect: Outside the SEZ, impacts could occur from habitat loss or modification related to groundwater depletions, surface runoff, dust, noise, lighting, or accidental spills. Potential for adverse impacts from new roads and increased traffic. Increased noise levels in the vicinity of the SEZ could result in disruption of breeding, migration, wintering, foraging, and other behavioral activities. Cumulative: If development of solar facilities occurred at both Antonito Southeast and Los Mogotes SEZs, or if other actions occurred in the vicinity, there could be cumulative impacts on wildlife and aquatic biota habitat. Where projects are closely spaced, the cumulative impact on a particular species could be moderate to large. Data Gaps: Impacts on terrestrial wildlife from construction and operational noise would have to be considered on a project-specific basis. Research is needed on the required effective width of big game migration corridors through the Rio Grande del Norte National Monument and through the Antonito Southeast SEZ.	The following SEZ-specific programmatic design features for avoidance will be required: Prairie dog colonies (if present) will be avoided to the extent practicable; doing so would reduce impacts on associated mammalian and avian species such as desert cottontail, burrowing owl, thirteen-lined ground squirrel, mountain plover, and ferruginous hawk. Construction will be curtailed during winter when big game species are present, particularly within elk critical winter range. Disturbance near elk and mule deer resident population areas will be avoided. Development in the 253-acre (1-km^2) portion of the SEZ that overlaps the pronghorn summer concentration area will be avoided. Development will avoid any additional wetlands identified during future site-specific fieldwork. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf	The following SEZ-specific programmatic design features for minimization will be required: Disruptions during lambing/calving/fawning season for big game (such as bighorn sheep/elk/pronghorn) will be minimized. Appropriate engineering controls will be used to minimize impacts resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to wetland, dry wash, and riparian habitats, Where big game winter ranges intersect or are within close proximity to the SEZ, use of motorized vehicles and other human disturbances will be controlled (e.g., through road closures or seasonal restrictions). Fencing around the solar energy development should not block the migratory corridors of mammals, particularly big game species. *See endnote* [i]	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact to functional habitat for full build-out of SEZ. Little can be done onsite to mitigate the loss of up to 9,712 acres of general wildlife habitat.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Ecology: Migratory Birds Section 10.1.11.2	Direct: Loss of habitat and connectivity for several species. Noise, lighting, and vegetation clearing could impact migratory birds overflying, migrating, or using the SEZ. There is potential for migratory birds to be attracted to solar arrays (because solar arrays may appear to be water or wetlands, and may attract insects), resulting in collisions with solar arrays that cause injury or fatalities. Migratory birds may be behaviorally susceptible to flight collision with solar arrays in the San Luis Valley wetlands landscape. Avian injury or fatality from collision with solar arrays is a particular risk at Antonito Southeast SEZ due to the location of the SEZ in migratory bird paths. For power tower facilities, burning of wings in the solar radiation field between heliostats and power towers has been observed. Indirect: Outside the SEZ, impacts could occur from habitat loss or modification related to groundwater depletions, or habitat loss or modification through the introduction of invasive species. Establishment of noxious weeds in the SEZ may result in spread of weeds to adjacent areas. Increased noise levels in the vicinity of the SEZ could result in disruption of breeding, migration, wintering, foraging, and other behavioral activities. Cumulative: Impacts to migratory birds could occur, depending on the number and location of other developments in the region. Data Gaps: Additional research needed on solar development impacts on migratory birds (and how far such impacts would extend away from the SEZ); impacts on migratory birds from construction and operational noise would have to be considered on a project-specific basis.	SEZ-specific programmatic design features require that if present, prairie dog colonies (which could provide habitat or food resources for some bird species) will be avoided to the extent practicable; doing so would reduce impacts on associated bird species such as raptors. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS ER2-6: Consider the applicability of guidelines developed by the Avian Power Line Interaction Council. SRMS ER2-7: Evaluate implementation of technologies that minimize the amount of reflective surfaces, or alter how the surfaces are perceived by wildlife, that will reduce the "lake effect" in attracting migratory birds and other wildlife.	See programmatic design features at URL under Avoidance column. SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS ER2-8: Evaluate construction timing restrictions in project-level NEPA alternatives to further reduce impacts. Timing limitation should be enforced from May 15-July 15 for any surface disturbing activities to protect migratory bird nesting and brood rearing, SRMS ER2-9: Conduct Raptor nest surveys within a 0.5 mile radius of the project site, If any raptor nests are located, appropriate timing limitations should be applied. SRMS ER2-10: Conduct Migratory bird monitoring in the Antonito Southeast SEZ	Yes. Some level of bird injury/fatality has been observed for all types of solar facilities (through collisions with equipment or from burns). Research is ongoing to quantify impacts and identify effective mitigation measures.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Ecology: Plant Special Status Species Section 10.1.12	Direct: Ground disturbance, land clearing and grading, fugitive dust generated by project activities, and the spread of invasive species would result in loss of special status plant species habitat, if present, and might result in loss of individual plants. See also impact summary above under Vegetation and Riparian Areas. No Endangered Species Act (ESA)-listed species have been identified that have suitable habitat within the SEZ. BLM local biologists indicate that Ripley's milkvetch and rock-loving aletes, BLM-sensitive species, may have suitable habitat within the SEZ. Indirect: Indirect impacts to individuals and habitat outside of the SEZ could occur from groundwater depletions, surface runoff, dust, or accidental spills. Suitable habitat for five BLM-sensitive plant species has been identified within 5 mi (8 km) of the SEZ boundary. Cumulative: There could be cumulative impacts on some special status plant species due to habitat destruction and overall development and fragmentation of the area. Data Gaps: Although habitat for listed species has not been identified within the SEZ, pre-disturbance surveys are required to identify the presence and abundance of special status species.	The following programmatic design features for avoidance will be required: Based on data from pre-disturbance surveys, disturbance to occupied habitats will be avoided to the extent practicable per BLM Manual 6840. Disturbance of wetland and riparian habitat within the SEZ will be avoided or minimized to the extent practicable. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf See also avoidance measures listed for Vegetation and Riparian Areas, which would apply for Plant Special Status Species as well.	The following programmatic design features for minimization will be required: If avoidance is not possible for some species, translocation of individuals from areas of direct effects or compensatory mitigation (for example, through seed collection or reseeding at an appropriate offsite location) may be employed. Groundwater withdrawals will be avoided or limited to reduce impacts on groundwater-dependent special status species, including those species that may occur in riparian or aquatic habitats supported by groundwater. See other programmatic design features at URL under Avoidance column. See also minimization measures listed for Vegetation and Riparian Areas, which would apply for Plant Special Status Species as well.	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ. Development in the SEZ would result in alteration of up to 9,712 acres of habitat If present, little can be done onsite to mitigate the loss of two special status plant species (Ripley's milkvetch and rock-loving aletes) that may be present within the SEZ. Avoidance of individual plants may not be practical.

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Ecology: Animal Special Status Species Section 10.1.12	Direct: Ground disturbance, land clearing and grading, and fugitive dust generated by project activities would result in loss of special status animal species habitat, if present, and might result in loss of individual animals. See also impact summaries above under Terrestrial Wildlife and Migratory Birds. Development on the SEZ could directly disturb individuals or habitat for one ESA-listed species (southwestern willow flycatcher) and eleven BLM-Colorado and New Mexico sensitive special status animal species (including Gunnison's prairie dog, ferruginous hawk, mountain plover, western burrowing owl, big free-tailed bat, and swift fox). Indirect: Indirect impacts to individuals and animal habitat outside of the SEZ could occur due to groundwater depletions, surface runoff, dust, noise, lighting, or accidental spills. Potential for impacts from new roads and increased traffic. Suitable habitat for three additional ESA-listed or candidate/proposed species (Mexican Spotted owl, Western yellow-billed cuckoo, and the New Mexico jumping mouse) and 5 additional BLM-sensitive animal species (including special status migratory waterfowl and shorebirds) occurs within 5 mi (8 km) of the SEZ boundary. Cumulative: There could be cumulative impacts on some special status animal species due to habitat destruction and overall development and fragmentation of the area. Data Gaps: Pre-disturbance surveys are required to identify the presence and abundance of special status species.	The following programmatic design features for avoidance will be required: Based on data from pre-disturbance surveys, disturbance to occupied habitats will be avoided to the extent practicable (per BLM Manual 6840). Disturbance of wetland and riparian habitat within the SEZ will be avoided or minimized to the extent practicable. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf See also avoidance measures listed for Terrestrial Wildlife and Migratory Birds, which would apply for Animal Special Status Species as well.	The following programmatic design features for minimization will be required: If avoidance is not possible for some species, augmentation, reintroduction, or translocation of individuals from areas of direct effects or compensatory mitigation may be employed. Groundwater withdrawals will be avoided or limited to reduce impacts on groundwater-dependent special status species, including those species that may occur in riparian or aquatic habitats supported by groundwater. These species include the Southwestern willow flycatcher and the Western yellow-billed cuckoo. *See endnote* [ii]	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact to functional habitat for full build-out of SEZ.

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Environmental Justice Section 10.1.20	Direct: Based on guidelines from the Council on Environmental Quality, there are low income and minority populations within a 50-mile (80-km) radius and potentially downwind of the SEZ, notably in Antonito and surrounding Conejos County communities. Communities and neighborhoods adjacent to the Antonito SE SEZ have higher minority populations relative to the Colorado average (77% vs 30% minority) and have higher proportion of low-income population relative to the state average (51% vs 30% low-income; EPA EJ Screen Reports, 2015). Disturbance of soils (particularly subsurface calcic soils) may produce fugitive dust and result in exposure to respirable particulates and/or microbes (human health impacts). SEZ dust would burden low income and minority populations in Conejos County at proportionately higher levels relative to other Colorado populations. Additional adverse impacts that might disproportionately affect minority and low-income populations include noise; reduced water quality and availability for agricultural and ranching water users; the visual impacts of solar energy facilities; negative effects on heritage livestock grazing; restricted access to land used for economic, recreation, sustenance hunting, or cultural/religious purposes; and effects on property values. Also, surface runoff, related erosion, and weed introduction could burden low income and minority populations and non-federal costs of service (i.e., weed control) in Conejos County at a higher proportion relative to other Colorado populations. The *benefits* of BLM solar energy development to low income and minority populations in Conejos County may include some local employment opportunity and expanding integration with the regional renewable energy sector. Indirect: Projects could impose indirect costs to county services (roads, schools, clinic, etc.). Cumulative: The economic and environmental benefit of Antonito Southeast SEZ development would accrue to a larger national public, including Conejos County. However, certain economic and environmental burdens would be greater on Conejos County than to a comparative county along the Front Range of Colorado. Cumulative contributions to the economy and environment from solar development could be moderated by offset compensation investments. Data Gaps: County government tax revenue from improvements on federal land. (Source: Colorado Division of Property Taxation)	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Environmental_Justice.pdf SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS AQC2-2: Avoid construction during times of high dust emissions from other sources (e.g., agricultural plots) should also be considered. SRMS AQC2-3: The SEZ solar project Vegetation Management Plan should quantify site baseline soil protective cover and set project construction and operation-phase ground-level wind surface friction control targets beneath and surrounding solar arrays to reduce dust generation.	Programmatic design features for air quality include a requirement to implement dust suppression measures during construction and operations. Should reduce cumulative health impacts from built and natural environment. See other programmatic design features at URL under Avoidance column. SRMS Project-level NEPA Recommendations SRMS-AQ3 Evaluate solar panel mounting and other disturbance minimizing technologies in project-level NEPA alternatives (e.g. no grading of the site, retention of maximum native vegetation, use of low emission vehicles, placing gravel on roads, use of “drive and crush” installation).	Yes. SEZ development as a public land use in Conejos County, including associated federal revenues generated and residual environmental impacts, will be cumulative to historic forces that have contributed to a rural people’s economic status. The 21st-century BLM solar energy development benefit and burden impact to low income and minority people includes their relationship with the federal government, and is influenced by multigenerational economic impacts of early 20th century federal land tenure transfers of the Conejos Land Grant, including the Antonito Southeast SEZ.

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Hydrology: Surface Water and Water Quality Section 10.1.9	Direct: Land clearing, land leveling, vegetation removal, groundwater use, and spills and runoff associated with development of the SEZ have the potential to alter flow routing, change surface runoff, reduce infiltration/recharge, cause loss of ephemeral stream networks, reduce evapotranspiration rates, increase sediment transport (by water), change sediment transport (by wind), and degrade water quality. Indirect: Indirect impacts from development and groundwater use on ephemeral and perennial surface water features could occur. Indirect effects from development and groundwater use on ephemeral and perennial surface water features may include reduced water quality and availability for agricultural and ranching water users. Cumulative: Alterations to ephemeral stream networks can alter groundwater recharge and surface runoff processes potentially impacting the basin-scale water balance and water quality aspects of water features receiving surface runoff. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Water.pdf SRMS Project-level NEPA Analysis Recommendations SRMS WR1: Project-level NEPA alternatives should evaluate maintenance of existing flow patterns at the site boundary, by avoiding ephemeral drainages and/or providing detention and/or retention facilities. To avoid any impact to downstream properties, detention can be provided on the SEZ to capture the volume of flow that is represented by the increase between existing and proposed conditions. Retention could be utilized to capture all the additional flow volume with little to no overland surface water release. SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS WR2-2: The Vegetation Management Plan should include the maintenance of the maximum acreage of native vegetation cover practicable during construction and operation, and minimization of land disturbance in ephemeral washes and dry lakebeds.	. See programmatic design features at URL given under Avoidance column.	Yes. Development of the SEZ may alter ephemeral stream channels that can impact runoff and groundwater recharge. Reductions to the connectivity of these areas with surface waters and groundwater could limit water availability and thus alter the ability of the area to support vegetation growth and diversity, generating critical habitat areas and connecting wildlife corridors.

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Hydrology: Groundwater Quality and Groundwater Availability Section 10.1.9	Direct: The Antonito Southeast SEZ is located in the Rio Grande Basin. Groundwater withdrawals for development may cause declines in groundwater elevations that can impact water availability for surface water features, vegetation, ecological habitats, regional groundwater flow paths, and other groundwater users in the basin. Spills associated with development of the SEZ have the potential to degrade groundwater quality. Indirect: Groundwater withdrawals for solar energy facilities have the potential to affect other groundwater users in the basin. Indirect effects of groundwater withdrawal on connected perennial surface water features may include reduced water quality and availability for agricultural and ranching water users. Cumulative: Groundwater depletion has continued in the San Luis Valley aquifer system since 1950 due to withdrawal for agricultural and other purposes. Groundwater use for solar energy development may result in additional use of groundwater. However, the strict management of water resources in the Rio Grande Basin acts to ensure that any impacts from a new water use would continue to be equivalent to or less than those from current uses and that no net increase in the total amount of water used would occur. Data Gaps: None identified.	Groundwater use analyses suggest that full build-out of wet-cooled technologies is not feasible. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Water.pdf SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features: SRMS WR2-3: If project-specific impacts to groundwater are identified, purchase of existing water rights must be evaluated to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table.	Programmatic design features require that, for mixed-technology development scenarios, any proposed projects would have to reduce water requirements to a level sufficient to secure water rights and comply with water management in the San Luis Valley. Augmentation/ compensation is required by the State of Colorado. See other programmatic design features at URL under Avoidance column.	Yes The nature of the solar technology deployed will dictate water requirements. Dependent on compensation requirements, on the water demands of the development, and whether the subsurface hydrology is affected. Onsite mitigation will reduce, but will not eliminate the need for water.
Lands & Realty Section 10.1.2	Direct: Development of the SEZ could disturb 9,712 acres (39.3 km^2). Solar development could isolate an approximately 1,240-acre (5-km^2) parcel of public land abutting the west end of the SEZ from the rest of the public lands in the SEZ making it difficult to manage. Indirect: Increased traffic and increased access to previously remote areas also could change the overall character of the landscape. Public land availability to solar developers under constrained regional transmission infrastructure and power purchase agreement markets could conceivably indirectly impact private land markets and county revenues Cumulative: The contribution to cumulative impacts of utility-scale solar projects on public lands on and around the Antonito Southeast SEZ could be significant, particularly if the SEZ is fully developed with solar projects. Data Gaps: None identified.	SEZ-specific programmatic design features require that management of the 1,240-acre (5.0-km^2) area of public land west of the SEZ boundary should be addressed as part of the site-specific analysis of any future development within the SEZ. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Lands_and_Realty.pdf	See programmatic design features at URL under Avoidance column.	No. By regulation, any new activity must occur in deference to existing rights. Thus, potential impacts have been avoided.

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Livestock Grazing Section 10.1.4.1	Direct: Portions of three seasonal grazing allotments (San Antonio, South Hills, and Alta Lake) used by five permittees would be lost (64%, 67%, and 100%, respectively), and it is estimated in the Solar PEIS that solar development in the SEZ would result in a total loss of 575 animal unit months of forage per year. It is possible that solar development would result in the entire area of the three allotments being lost. The loss of use of grazing permits could result in an adverse economic impact on the permittees, and also possibly an adverse social impact, since for many permittees, operating on public lands has been a longstanding tradition. Two wells are present on the allotments and could be lost. The county would lose tax revenues (minor impact), and BLM would also lose some revenue. Indirect: None identified. Cumulative: Reductions in AUM's (Animal Unit Months) resulting from SEZ development would be cumulative to economic impacts to ranching families from drought-imposed forage conservation measures on public lands and broader trends to economic viability of ranching as a result of long-term variability in rangeland productivity from increasing temperature and dryness as climate change models predict for the region. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Rangeland_Resources.pdf	See programmatic design features at URL under Avoidance column.	Maybe. Reductions to allotments are likely. Also, there is potential for loss of permittee-funded range improvements. If development occurs within existing grazing allotments, little can be done onsite to mitigate the loss of grazing. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA.
Military & Civilian Aviation Section 10.1.6	Direct: The SEZ is located under two military training routes that have a floor elevation of 200 ft (322 m) above ground level (AGL). In comments on the Solar PEIS, the military indicated that at that time it had no concerns about potential impacts on its activities associated with solar development. There are no civilian aviation facilities in the vicinity of the SEZ. Indirect: None identified. Cumulative: Cumulative impacts would be small. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Military_Civilian_Aviation.pdf	Coordination with the military will be required on a project-specific basis to ensure that solar facilities do not interfere with operations. See other programmatic design features at URL under Avoidance column.	No. In comments on the Solar PEIS, the military indicated that at that time it had no concerns about potential impacts on its activities associated with solar development.

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Minerals Section 10.1.8 and Section 10.1.24 of the Final Solar PEIS	Direct: The SEZ does not contain existing oil and gas leases, mining claims, or geothermal leases. The SEZ has been withdrawn from receiving new mining claims for a period of 20 years, precluding impacts from many types of mining activities. Indirect: None identified. Cumulative: None identified. Data Gaps: None identified.	Not applicable	Not applicable	No
Native American Concerns Section 10.1.18	Direct: It is likely that some plants traditionally important to Native Americans will be destroyed and that habitat of traditionally important animals will be lost. A portion of the Picuris Trail (Route to Cuartelejo) likely runs through the SEZ and has significance to the Picuris Pueblo, the Jicarilla Apache, and possibly the Ute. It is also significant to the Navajo as a former "War Trail." Indirect: Indirect visual and auditory impacts are possible. For example, it is possible that there will be Native American concerns about potential visual effects and the effects of noise from solar energy development in the SEZ on Blanca Peak, Ute Mountain and San Antonio Peak. There would be general habitat loss with vegetation clearing and water reduction that could affect plant and wildlife species and ecosystem health. No impacts are likely to occur on the following known culturally significant areas outside of the SEZ (i.e., San Luis Lakes and the Great Sand Dunes). Cumulative: Impacts on significant cultural resources and cultural landscapes associated with Native American groups are possible. The viewsheds of Los Mogotes Peaks and San Antonio Mountain, both significant to the Ute and Jicarilla Apache Tribes, may be impacted. It is possible that the development of utility-scale solar energy projects in the SEZ, when added to other potential projects likely to occur in the area, could contribute cumulatively to visual impacts in the valley as viewed from Blanca Peak and to the loss of traditionally important plant species and animal habitat. Data Gaps: Government-to-government consultation will be required to determine issues of Native American concern.	The following SEZ-specific programmatic design features for avoidance will be required: Known human burial sites and rock art (panels of petroglyphs and/or pictographs) will be avoided. Where there is a reasonable probability of encountering undetected human remains and associated funerary objects by a solar project, the BLM will carry out discussions with Indian tribes before the project is authorized, in order to provide general guidance on the treatment of any cultural items that might be exposed. Visual intrusion on sacred sites will be avoided to the extent practicable. Springs and other water sources that are or may be sacred or culturally important will be avoided to the extent practicable. Culturally important plant and wildlife species will be avoided to be extent practicable. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Native_American_Concerns.pdf	See programmatic design features at URL under Avoidance column.	Yes. Residual impacts to be evaluated based on results of Landscape-Level Cultural Heritage Values Assessment analyses and coordination with tribes.

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Paleontology Section 10.1.16	Direct: Impacts on significant paleontological resources are possible in those areas where the Alamosa Formation is determined to be at a depth that could be affected by solar energy development. Indirect: The potential for impacts from looting or vandalism north of the SEZ in areas classified as PFYC Class 4 or 5 is unknown, but not likely if the Alamosa Formation is not exposed at the surface. Cumulative: The SEZ has a low to undetermined potential for paleontological resources. Therefore, will not have a cumulative impact on paleontological resources. Data Gaps: A more detailed look at the local geological deposits and their depth is needed to verify that the assignment of a PFYC of Class 1 is valid by determining whether the Alamosa Formation is exposed and whether paleontological resources are present at the surface.	SEZ-specific programmatic design features require that PFYC Class 4 or 5 areas be avoided to the extent possible for development within the SEZ (e.g., the 4-acre [0.016-km2] parcel in the north part of the SEZ) and any other parcels identified through additional surveys. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Paleo.pdf	Programmatic design features require that the BLM be notified immediately upon discovery of fossils. Work will be halted at the fossil site and continued elsewhere until qualified personnel, such as a paleontologist, can visit the site, determine the significance of the find, and, if significant, make site specific recommendations for collection or other resource protection. See other programmatic design features at URL under Avoidance column.	No, Any paleontological resources that are discovered will be preserved.

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Recreation Section 10.1.5	Direct: Solar development will preclude current recreational activities that may occur within the SEZ boundary. Vehicle routes currently open within the SEZ could be closed or rerouted. The SEZ will be readily visible to travelers on U.S. 285 and on the Los Caminos Antiguos Scenic Byway. Only a small impact to pronghorn antelope hunting is likely because only a small portion of available habitat occurs within the SEZ. There could be an impact on potential future recreational use of the Chili Line (could be used for hiking/biking). Indirect: Indirect effects could occur on lands near the solar facilities or on viewsheds of surrounding areas and would result from the change in the overall character of undeveloped BLM-administered lands to an industrialized, developed area, displacing people who are seeking more rural or primitive surroundings for recreation. Great Sand Dunes National Park and Preserve, th Old Spanish National Historic Trail, two scenic railroads, the Los Caminos Antiguos Scenic Byway, the Sangre de Cristo Mountains, three national wildlife refuges, and numerous designated wilderness areas are among the highlights of the recreational and tourism opportunities of the area. Because the route of the West Fork of the North Branch of the Old Spanish Trail segment under study is so near the SEZ, it is anticipated that the viewshed of the Trail would be adversely affected and the potential future recreational attraction of the Trail might be reduced. However, the integrity and historical significance of the portion of the Trail near to the SEZ remain undetermined. Cumulative: Multiple developments in the vicinity of the SEZ could cumulatively reduce recreational opportunities. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Public_Access_and_Recreation.pdf	SEZ-specific programmatic design features require that, as projects are proposed for the SEZ, the potential impacts on tourism will be considered and reviewed with local community leaders. If vehicle routes currently open within the SEZ are closed or rerouted, alternative routes may be established. See other programmatic design features at URL under Avoidance column.	Maybe. Depends on mitigation measures implemented on the basis of project-level NEPA. Relatively little recreation currently occurs in the SEZ. If new vehicle routes are established, a NEPA analysis would be required for those routes. Impacts to potential future use of the Chile Line for hiking/biking, or to visual enjoyment of the area, will be difficult to mitigate onsite.

Socioeconomics Section 10.1.19	Direct: Beneficial impacts on the local economy as a result of expenditures of wages and salaries and the collection of state sales and income taxes (from the workforce as well as property tax revenue from the construction of these facilities). Construction-related jobs would be temporary and the number of jobs would depend on the technology, number of facilities constructed concurrently, and size of each facility. Operational jobs will be more permanent and the number of jobs also depends on the type of technology and size of each facility). The adverse impacts, including county and/or state government costs, could occur locally or regionally due to the need for services for new workers during project construction and operation (e.g., housing, police, fire-fighters). Indirect: Beneficial impacts on the local economy as project wages and salaries, procurement expenditures, and tax revenues circulate through the economy of each state, thereby creating additional employment, income, and tax revenues. Indirect construction and operations jobs would depend on the technology, number of facilities constructed concurrently, and size of each facility. Beneficial impacts would be minor. As estimated in the Solar PEIS, restricted land use from solar energy development could result in the loss of livestock grazing (including loss of jobs), a decline in grazing fees payable to the BLM and the county, and reduced opportunities for recreation and tourism (including economic impacts). Public land availability to solar developers under constrained regional transmission infrastructure and power purchase agreement markets could indirectly impact private land markets and county revenues due to competition for transmission availability. Water requirements for Antonito Southeast SEZ solar development would represent a new industrial use in a Colorado water resource sub-district in the Conejos River basin that is currently constrained and under review in State of Colorado water court. New utility-scale uses could indirectly affect agricultural water users and markets. If hunting in or near SEZ declines due to solar development, there could be a loss of revenue to the State due to fewer issued hunting licenses. Cumulative: Beneficial impacts overall would include creation of additional jobs and income. The negative impacts, including some short-term disruption of rural community quality of life, would likely be short-term and/or specific to individual projects on the SEZ. Data Gaps: Additional information on extent of disruption of rural community quality of life.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Socioeconomics.pdf	See programmatic design features at URL under Avoidance column. <u>SRMS Recommended Project-Level NEPA Antonito Southeast SEZ Specific Design Features:</u> <u>SRMS S1-2:</u> Onsite mitigation could include requiring developers to secure agreements for local government services as a condition of "Notice to Proceed".	Maybe. See Environmental Justice. For grazing impacts, depends on mitigation measures implemented on the basis of project-level NEPA. No shared revenue to state and local government from federal land rental and MW usage fees under current federal laws and regulations.

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Soils/Erosion Section 10.1.7	Direct: Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling), especially during the construction phase of a solar project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. Soils within the SEZ are predominantly very stony loams and cobbly loams of the Travelers and Garita Series, which together make up about 96% of the soil coverage at the site. Soil loss through sediment transport may occur. Soil contamination from spills could occur. Disturbance of soils (particularly subsurface calcic soils) may produce fugitive dust. Indirect: Disturbance of soil can lead to introduction of invasive species. Elevated PM levels could result from soil disturbance/ grading activities during construction. Cumulative: Cumulative impacts would occur from the disturbance of several renewable energy projects, connecting linear facilities, and other projects in the vicinity of the SEZ, but would be limited through application of design features. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Soil_Geologic_Hazards.pdf In addition, a Vegetation Management Plan should be required that includes the maintenance of the maximum acreage of native vegetation cover practicable during construction and operation to avoid dust sources.	See programmatic design features at URL under Avoidance column.	Yes. Level of site grading would be primary driver of residual impact for full build-out of SEZ. Little can be done to mitigate the loss of up to 9,712 acres of soil. Avoidance (not developing some areas) will reduce the acreage and soil stabilization measures can reduce soil erosion post disturbance.

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Specially Designated Areas - General Section 10.1.3	Direct: Specially designated areas (SDAs) within 25 miles (40 km) of the SEZ that could be impacted by solar development include the following: the Rio Grande del Norte National Monument, Alamosa National Wildlife Refuge, South San Juan Wilderness Area (WA), Latir Peak WA, Cruces Basin WA, San Luis Hills Area of Critical Environmental Concern (ACEC), Cumbres & Toltec Scenic Railroad (CTSR) ACEC and National Historic Landmark, Rio Grande River Corridor ACEC, San Antonio Gorge ACEC, San Luis Hills Wilderness Study Area (WSA), San Antonio WSA, Rio Grande Natural Area, Rio Grande Wild and Scenic River, Rio Grande Corridor Special Recreation Management Area (SRMA), Los Caminos Antiguos Scenic Byway, Continental Divide National Scenic Trail, Sangre de Cristo National Heritage Area (NHA), and the West Fork of the North Branch of the Old Spanish Trail segment under study. Moderate to strong visual contrasts could be experienced in the San Antonio WSA, the Los Caminos Antiguos Scenic Byway, along portions of the West Fork of the North Branch of the Old Spanish Trail segment under study, San Luis Hills WSA and ACEC, and the CTSR ACEC. There would also be strong visual contrasts for some viewpoints within the newly designated Rio Grande del Norte National Monument. Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare), reduced recreation use, fragmentation of biologically linked areas, and loss of public access. Indirect: Nearby specially-designated areas could be impacted by development inside the SEZ, and also by increased traffic. Cumulative: Development of solar facilities and other facilities may result in cumulative effects, particularly visual impacts, on SDAs. Data Gaps: For projects in the Antonito Southeast SEZ that are located within the viewshed of the West Fork of the North Branch of the Old Spanish Trail segment under study, further study is needed, which may include archival research, archaeological investigation, and viewshed analysis, to determine the area of possible adverse impact.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/SDAs_and_LWC.pdf	SEZ-specific programmatic design features require that early consultation be initiated with the entity responsible for developing the management plan for the Sangre de Cristo NHA, in order to understand how development of the SEZ could be consistent with NHA plans/goals. See other programmatic design features at URL under Avoidance column.	Yes. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA. For visual impacts, full development of the SEZ with solar facilities would cause moderate to strong visual contrasts that could not be hidden from view from some of the specially designated areas.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Specially Designated Areas - Lands with Wilderness Characteristics Section 10.1.3	Direct: A recent lands with wilderness characteristics (LWC) Inventory Update for LWC Units Upper Punche Valley (001-2016) and Los Mogotes (002-2016) determined that 8,559 acres of public land within the Antonito Southeast SEZ contain wilderness characteristics). The wilderness character of this area could be impacted by development in the SEZ. Indirect: Nearby land meeting criteria for wilderness characteristics could be impacted by development inside the SEZ. Increased traffic and increased access to previously remote areas could negatively impact lands with wilderness characteristics. Cumulative: Development of solar facilities and other facilities may result in cumulative effects, particularly visual impacts, on lands with wilderness characteristics. Data Gaps: Additional work regarding BLM''s LWC inventory may be warranted.	Programmatic design features include a requirement to consider options to avoid, minimize, and/or mitigate impacts to lands with wilderness characteristics as part of the project-specific environmental impact analysis, in coordination with the BLM. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/SDAs_and_LWC.pdf	See programmatic design features at URL under Avoidance column.	Yes,
Transportation and Public Access Sections 10.1.2 and 10.1.21	Direct: Development will add traffic to existing roads serving the area. U.S. 285 provides a regional traffic corridor that could experience moderate impacts for single projects, an increase during construction of nearly twice the current annual average daily traffic value for this route. Local roads would also be impacted. Glint and glare from solar facilities may affect aircraft pilots, motorists on nearby roads, or crew/passengers on nearby railways. Indirect: Potential for adverse impacts to wildlife from new roads and increased traffic (see Ecology-Wildlife section). Cumulative: Cumulative impacts to traffic could occur with multiple developments in the region. Data Gaps: None identified.	Programmatic design features for visual resources include a requirement to minimize glint and glare. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Transportation.pdf	The following SEZ-specific programmatic design features for minimization will be required: Public access to roads will be maintained through transportation management plan. Local roads improvements will be made to accommodate additional traffic. Construction activities will be planned to minimize impacts (e.g., send trucks in tandem). See other programmatic design features at URL under Avoidance column.	No, Through a combination of avoidance, design features, and the establishment of alternative access routes to these areas, the potential impacts to transportation can be adequately mitigated.

Resource/ Issue	Antonito Southeast SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts?[3] (Include justification)
		Avoidance	Minimization	
Visual Section 10.1.14	Direct: About 40% of the SEZ lands are classified as Visual Resource Inventory (VRI) Class III lands, indicating moderate scenic quality in those areas. The other SEZ lands are classified as VRI Class IV lands, indicating low scenic quality, except for 1% of the lands which are VRI II indicating high scenic quality. Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare). The Solar PEIS identified strong visual contrasts for some viewpoints in the San Antonio WSA, Los Caminos Antiguos Scenic Byway, West Fork of the North Branch of the Old Spanish Trail segment under study, and for the community of Antonito. There would also be strong visual contrasts for some viewpoints within the newly designated Rio Grande del Norte National Monument. Moderate visual contrast levels would be expected for high-elevation viewpoints in the San Luis Hills WSA, San Luis Hills ACEC, and for railroad passengers in portions of the CTSR Corridor and the CTSR Corridor ACEC. Indirect: None identified. Cumulative: If several projects become visible from one location or in succession as viewers move through the landscape (such as driving on local roads, these cumulative impacts may make the area less visually appealing. Data Gaps: Additional data from key observation points may be needed.	SEZ-specific programmatic design features state that the development of power tower facilities within the SEZ should be prohibited. Additionally, there is a requirement to minimize glint and glare. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Visual.pdf	SEZ-specific programmatic design features state that special visual impact mitigation will be considered for solar development on lands in the SEZ visible from and within 3 mi (5 km) of the centerline of the West Fork of the North Branch of the Old Spanish Trail segment under study, and on lands in the SEZ visible from and within 3 mi (5 km) of the CTSR ACEC and San Antonio WSA. Special mitigation should also be considered for impacts to the Los Caminos Antiguos Scenic Byway. See other programmatic design features at URL under Avoidance column.	Yes. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA, While onsite mitigation would reduce visual contrasts caused by solar facilities within the SEZ, it would not likely reduce impacts to less than moderate or strong levels for nearby viewers.
Wild Horses and Burros Section 10.1.4.2	There are no designated wild horse and burrow herds present in the area. There would be no effect on designated wild horse and burro herds from solar energy development of the SEZ. Data Gaps: None identified.	Not applicable	Not applicable	No

Endnotes:

[i] Ecology – terrestrial Wildlife (continued)

Undisturbed buffer areas and sediment and erosion controls will be maintained around Alta Lake and associated wetlands in the western portion of the SEZ.
The use of heavy machinery and pesticides will be avoided within the immediate catchment basins for Alta Lake and its associated wetlands.
See other programmatic design features at URL under Avoidance column.

[ii] Ecology – Animal Special Status Species (continued):
Consultations with the USFWS, CO Division of Wildlife and NM Division of Game & Fish will be conducted to address the potential for impacts on the Southwestern willow flycatcher, Gunnison's prairie dog, Northern leopard frog, and New Mexico meadow jumping mouse.
See other programmatic design features at URL under Avoidance column.
See also minimization measures listed for Terrestrial Wildlife and Migratory Birds, which would apply for Animal Special Status Species as well.

BLM Colorado-New Mexico Summary of Resource Impacts (Includes Degree of Onsite Mitigation and Recommendations for Project-level NEPA Analysis, and Assessment of Residual Impacts) for the **De Tilla Gulch Solar Energy Zone** (SEZ)

Location: Central Saguache County, Colorado, BLM San Luis Valley Field Office - 1,064 developable acres, up to 170 MW generation capacity.

Sources: Summarized from Draft and Final Solar PEIS for the SEZ (at: http://blmsolar.anl.gov/sez/co/de-tilla-gulch/), with BLM Interdisciplinary Team (IDT) input.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Acoustics Section 10.2.15[4]	Direct: Increased noise levels during construction and operation of solar facilities with thermal energy storage could cause noise levels slightly exceeding the EPA guideline of 55 dBA at the nearest residences (about 0.3 mi [0.5 km] to the east), particularly for activities near the eastern SEZ boundary. The EPA guideline could also be exceeded near the southern SEZ boundary, where the Old Spanish National Historic Trail is 0.25 mi [0.4 km] away. A level of 55 dBA is similar to the noise of an air conditioning unit at 100 ft. Noise impacts during operation of PV facilities would be minimal. Indirect: Based on Solar PEIS modeling, none identified. Cumulative[5]: If multiple facilities were to be constructed close to the SEZ, residents and/or wildlife nearby could be affected by the noise generated, particularly at night when the noise is more discernible due to relatively low background levels. Data Gaps[6]: Impacts on wildlife from construction noise needs to be considered on a project-specific basis. Refined modeling and background measurements would be needed.	Programmatic design features include a requirement that projects will be designed to locate solar facilities will be located far enough away from residences, or include engineering and/or operational methods such that county, state, and/or federal regulations for noise are not exceeded. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Noise.pdf	Programmatic design features include a requirement to limit the hours of daily activities, construct noise barriers if needed and practicable, and coordinate with nearby residents. See other programmatic design features at URL under Avoidance column. <u>SRMS Project-level NEPA Recommendation: A-1</u> Evaluate construction timing restrictions in project-level NEPA alternatives to further minimize effects on wildlife (e.g., no construction during breeding season or in winter use concentration areas/critical winter range).	Maybe (for wildlife). Generally, impacts from solar development are expected to be temporary, localized, and readily mitigated. Technology used and onsite mitigation implemented would be primary driver of residual impact for full build-out of SEZ.

[1] The residual or unavoidable impacts assessment assumes BLM-DOE Solar PEIS (ROD, 2012) analysis and 80% of the SEZ area will be used for solar development.

[2] These columns give examples of avoidance and minimization measures that are specified in the Record of Decision for the Final Solar PEIS and will be required. Additional avoidance and minimization measures proposed by the BLM IDT are listed and should be evaluated through project-specific environmental analyses. Monitoring is planned to verify the implementation and effectiveness of avoidance and minimization measures.

[3] Residual or unavoidable impacts are residual effects that cannot be adequately mitigated onsite by avoidance and/or minimization. Preliminary assessments are provided for comment.

[4] Section numbers are the same in both the Draft and Final Solar PEIS.

[5] Sections 10.2.22.4 of the Draft and Final Solar PEIS address cumulative impacts, which consider ongoing and reasonably foreseeable activities in the vicinity of the SEZ such as wind, geothermal, mining, agricultural, and commercial development; new roads, traffic, and off-highway vehicle use; and infrastructure such as transmission lines, and fences.

[6] Data gaps have not been identified for all resources in this table. Additional data gaps may be identified during future SEZ- or project-specific assessments.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Air Quality Section 10.2.13	Direct: Fugitive dust and equipment exhaust emissions during construction could result in short-term exceedance of National Ambient Air Quality Standards (AAQS) for particulate matter (PM) in SEZ vicinity. Predicted 24-hour PM_{10} concentration levels could exceed the AAQS at the nearest residence. Disturbance of soils (particularly subsurface calcic soils) may produce construction phase fugitive dust, particularly during exceptional wind events during spring, which may result in exposure to respirable particulates and/or microbes (human health impacts). Indirect: New SEZ source suspended PM could temporarily contribute to regional seasonal spikes in asthma and other respiratory ailments in a Colorado airshed with the highest proportion of low income and minority populations on a county basis. Decreased visibility in nearby residential (as close as 0.3 mi [0.5 km] to the east) or specially-designated areas due to elevated PM levels from soil disturbance/grading during construction. Increased PM would also increase dust-on-snow accumulation, possibly contributing to changes in stream runoff patterns. If used for dust abatement, magnesium chloride could be harmful to plants (due to increased chloride ions in runoff). Cumulative: Cumulative effects due to dust emissions during any overlapping construction periods would be small. Unpaved roads and agricultural practices could have cumulative impacts with respect to generation of PM in a region of Colorado with monitored Max 24-hr PM10 exceeding PM10 NAAQS (peak concentrations range ~140-600 mg/m^3, 2002-2013; Chang et al. 2016). New SEZ dust sources would be cumulative to extensive fallow irrigated agricultural circles and unpaved roads with respect to PM. Data Gaps: Monitoring for PM during all phases of development will be required to identify levels exceeding AAQS.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Air_Quality_Climate.pdf SRMS Project-level NEPA Recommendations: SRMS AQ1: Explicitly compare design, construction and operation measures in range of NEPA alternatives to evaluate on-site dust generation avoidance effectiveness. SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS AQC2-2: Avoid construction during times of high dust emissions from other sources (e.g., agricultural plots). SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS AQC2-2: Avoid construction during times of high dust emissions from other sources (e.g., agricultural plots) should also be considered. SRMS AQC2-3: The SEZ solar project. Vegetation Management Plan will quantify site baseline soil protective cover and set project construction and operation-phase ground-level wind surface friction control targets beneath and surrounding solar arrays to reduce dust generation.	Programmatic design features include a requirement to implement dust suppression measures during construction and operations. See other programmatic design features at URL under Avoidance column. SRMS Project-level NEPA Recommendations SRMS-AQ3 Evaluate solar panel mounting and other disturbance minimizing technologies in project-level NEPA alternatives (e.g. no grading of the site, retention of maximum native vegetation, use of low emission vehicles, placing gravel on roads, use of “drive and crush” installation). SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS AQC2-4:Revegetation of the SEZ with native vegetation to increase soil stability as a plan of development feature to further minimize the amount of grading and surface disturbance and promote reduced dust emissions and PM levels.	Maybe. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Climate Change Section 5.11.4 of DPEIS for soil storage capacity; 10.2.13 for emissions avoided	Direct: Possible impact through loss of carbon storage capacity of the soil (estimated at 100 g carbon/m^2). Preliminary calculations show loss of CO_2 storage capacity as 1.6 tons/acre/yr (1,362 tons/yr for SEZ full build-out), less than 1% of the CO_2 emissions avoided by operation of a solar facility (see below). Positive impact: Solar power generation reduces demand for energy from fossil fuels, and thereby reduces greenhouse gas emissions (from 164,000-295,000 tons/yr CO_2 avoided at full build out depending on technology). Indirect: If PM is highly elevated and results in increased dust-on-snow accumulation effects of climate change may be exacerbated (through early and/or fast stream run-off coupled with decreased snowpack). Cumulative: Over the long term, the development of solar energy may contribute to reduced greenhouse gas emissions, if the development offsets electricity generation by fossil fuel plants). About 90% of electricity in CO is produced in fossil fuel plants. Data Gaps: None identified.	See programmatic design features for vegetation at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS AQC2-3: The SEZ solar project. Vegetation Management Plan will quantify site baseline protective soil cover and set project construction and operation-phase ground-level wind surface friction control targets beneath and surrounding solar arrays to reduce dust generation.	See programmatic design features at URL under Avoidance column.	No

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Cultural Section 10.2.17	Direct: Impacts on the low-potential segments of the Old Spanish National Historic Trail (NHT) and the North Branch of the Old Spanish Trail are possible. Indirect: Impacts on significant cultural resources and cultural landscapes associated with high-potential segments of the Old Spanish NHT and American Latino heritage, such as within the Sangre de Cristo National Heritage Area, are possible throughout the San Luis Valley. Impacts on significant cultural resources and cultural landscapes associated with Native American groups are also possible. Erosion impacts on the cultural landscape outside of the SEZ resulting from land disturbances and modified hydrologic patterns, increased accessibility and potential for damage to eligible sites outside of the SEZ (if present). Cumulative: Dependent on whether eligible sites are found and impacted in the SEZ and adjacent areas. Data Gaps: Pre-development cultural inventory and evaluation will be completed, as part of the Section 106 consultation process. The survey will identify archaeological sites, historic structures and features, and traditional cultural properties, and evaluate whether any are eligible for listing in the NRHP. Additional investigation of the location, integrity, and significance of portions of the Old Spanish Trail (NHT and North Branch of the Old Spanish Trail) from which future development in the SEZ could be viewed (which may include archival research, archaeological investigation, and viewshed analysis) is needed to determine whether adverse impacts on the Old Spanish Trail would occur.	Programmatic design features require that significant cultural resources clustered in specific areas which retain sufficient integrity will be avoided. Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS-CR2-2: If adverse impacts are identified on the Old Spanish National Historic Trail and/or the North Branch of the Old Spanish Trail as a result of additional investigation, measures will be identified to prevent substantial interference and avoid any areas determined to be unsuitable for development. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Cultural.pdf	Programmatic design features require that a Memorandum of Agreement be developed and executed if eligible sites are discovered within the SEZ, to determine how the eligible properties will be treated (avoided or mitigated to minimize impacts). See other programmatic design features at URL under Avoidance column.	Yes. The discovery of new cultural sites is always a possibility, and adequate mitigation would be dependent on the resources discovered and their relative significance in the region. Residual impacts to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and coordination with stakeholders (federal, state, and local agencies, tribes, and public). In addition, impacts to non-renewable resources are both irretrievable and irreversible.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Vegetation and Riparian Areas; Section 10.2.10	Direct: Development will adversely affect characteristic vegetation (e.g., big sagebrush, rubber rabbitbrush, winterfat, western wheatgrass, green needlegrass, blue gramma, and needle-and-thread) through destruction and loss of habitat. Sensitive habitats on the SEZ include ephemeral dry washes. Development will result in small impacts to the following land types which comprise the SEZ: Inter-Mountain Basins Semi-Desert Shrub Steppe, Inter-Mountain Basins Greasewood Flat, and Inter-Mountain Basins Semi-Desert Grassland. Development, including vegetation removal, land clearing, grading, dust deposition, and lowered groundwater levels, may alter soils and vegetation communities. Indirect: Extensive areas of palustrine wetlands with emergent plant communities are located to the north and west of the SEZ. There may be loss of native vegetation outside the SEZ due to dust deposition from construction and operations, increased surface water runoff and related erosion, or through the introduction of invasive species. Cumulative: Solar energy development could be a contributor to cumulative impacts on some vegetation communities, depending on the type, number and location of other developments in the region. Data Gaps: None identified.	SEZ-specific programmatic design features require that all ephemeral dry wash habitats within the SEZ be avoided to the extent practicable. A buffer area will be maintained around dry washes to reduce the potential for impacts on these habitats on or near the SEZ. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS ER2-2: The Vegetation Management Plan should include the maintenance of the maximum acreage of native vegetation cover practicable, and compliance with applicable regulations and policies for the control of noxious weeds and invasive plant species (e.g., travel through weed-infested areas will be avoided; weeds will be treated, vehicles and machinery will be cleaned to remove weed seeds), to maintain ecological integrity and decrease the probability of wildfire	SEZ-specific programmatic design features require that appropriate engineering controls will be used to minimize impacts on wetland, dry wash, and riparian habitats, including downstream occurrences, such as those associated with Saguache Creek or San Luis Creek, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls will be determined through agency consultation. See other programmatic design features at URL under Avoidance column. SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS ER2-3Evaluate solar panel mounting and other disturbance minimizing technologies (e.g., no grading of the site) should be evaluated in project-level NEPA alternatives. SRMS ER2-4, If project-specific impacts to groundwater are identified, purchase of existing water rights must be used to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table.	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ. Development would result in direct removal or disturbance of native plant communities and the ecosystem services they provide. Many impacts to riparian areas can be mitigated onsite by avoiding development in riparian areas and by the installation of engineering controls on surface water runoff/erosion.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology – Invasive and Noxious Weeds Section 10.1.10	Direct:.Development, including vegetation removal, land clearing, grading, dust deposition, and lowered groundwater levels, may alter soils and vegetation communities and result in the establishment of invasive species and noxious weeds within the SEZ. Some weeds of concern include henbane, whitetop, Russian napweed, and Canada thistle. Indirect: There may be loss of native vegetation outside the SEZ due to the introduction of invasive species. Establishment of noxious weeds in the SEZ may result in spread of weeds to adjacent areas. Cumulative: Solar energy development could be a contributor to cumulative impacts on some vegetation communities, depending on the type, number, and location of other developments in the region. Data Gaps: Colonization rates of weed species.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS ER2-2: The Vegetation Management Plan should be required that includes the maintenance of the maximum acreage of native vegetation cover practicable, and compliance with applicable regulations and policies for the control of noxious weeds and invasive plant species (e.g., travel through weed-infested areas will be avoided; weeds will be treated, vehicles and machinery will be cleaned to remove weed seeds), to maintain ecological integrity and decrease the probability of wildfires.	See programmatic design features at URL under Avoidance column. RMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS ER2-5 Conduct surveying and treating invasive weeds, including henbane, should be conducted along access roads to the SEZ, and solar panel mounting and other disturbance minimizing technologies (e.g., no grading of the site) should be evaluated in project-level NEPA alternatives.	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ. Onsite mitigation will reduce, but not eliminate, the potential for invasive species establishment. The degree of disturbance creates a significant opportunity for the establishment of invasive species and weeds.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Terrestrial Wildlife Section 10.2.11	Direct: Loss of habitat and connectivity for several species of amphibians, reptiles, birds, invertebrates, and mammals including big game species (black bear, bighorn sheep, cougar, elk, mule deer, and pronghorn). Ground disturbance, fugitive dust generated by project activities, noise, lighting, vegetation clearing, spread of invasive species, accidental spills, harassment, and ephemeral stream loss could impact wildlife within the SEZ, and may cause mortalities. Indirect: Outside the SEZ, impacts could occur from habitat loss or modification related to groundwater depletions, surface runoff, dust, noise, lighting, or accidental spills. Potential for adverse impacts from new roads and increased traffic. Increased noise levels in the vicinity of the SEZ could result in disruption of breeding, migration, wintering, foraging, and other behavioral activities. Cumulative: If other actions in additional to SEZ solar development occurred in the vicinity, there could be cumulative impacts on wildlife and aquatic biota habitat. Where projects are closely spaced, the cumulative impact on a particular species could be moderate. Data Gaps: Impacts on terrestrial wildlife from construction and operational noise would have to be considered on a project-specific basis. Research is needed on the required effective width of big game migration corridors through the Rio Grande del Norte National Monument and through the De Tilla Gulch SEZ.	The following SEZ-specific programmatic design features for avoidance will be required: Prairie dog colonies (if present) will be avoided to the extent practicable; doing so would reduce impacts on associated mammalian and avail species such as desert cottontail, burrowing owl, and thirteen-lined ground squirrel. Construction will be curtailed during winter when big game species are present Ephemeral drainages within the SEZ will be avoided to the extent practicable. Development will avoid any wetlands identified during site-specific fieldwork. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf	The following SEZ-specific programmatic design features for minimization will be required: Disruptions during lambing/calving/fawning season for big game (such as bighorn sheep/elk/pronghorn) will be minimized. Appropriate engineering controls will be used to minimize impacts resulting from surface water runoff, erosion, sedimentation, accidental spills, or fugitive dust deposition on aquatic, riparian, and wetland habitats associated with Saguache Creek, San Luis Creek, Rio Grande Canal, and wetland areas located within the area of indirect effects. The extent of habitat disturbance will be minimized within the elk critical winter range and pronghorn winter concentration area. Where big game winter ranges intersect or are within close proximity to the SEZ, motorized vehicles and other human disturbances will be controlled (e.g., through road closures or seasonal restrictions). *See endnote* [i]	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact to functional habitat for full build-out of SEZ. Little can be done onsite to mitigate the loss of up to 1,064 acres of general wildlife habitat.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Migratory Birds Section 10.2.11.2	Direct: Loss of habitat and connectivity for several species. Noise, lighting, and vegetation clearing could impact migratory birds overflying, migrating, or using the SEZ or nearby wetlands. There is potential for migratory birds to be attracted to solar arrays (because solar arrays may appear to be water or wetlands, and may attract insects), resulting in collisions with solar arrays that cause injury or fatalities. Migratory birds may be behaviorally susceptible to flight collision with solar arrays in the San Luis Valley wetlands landscape. Avian injury or fatality from collision with solar arrays is a particular risk at DeTilla Gulch SEZ due to the location of the SEZ in migratory paths. For power tower facilities, burning of wings in the solar radiation field between heliostats and power towers has been observed. Indirect: Outside the SEZ, impacts could occur from habitat loss or modification related to groundwater depletions, or habitat loss or modification through the introduction of invasive species. Establishment of noxious weeds in the SEZ may result in spread of weeds to adjacent areas. Increased noise levels in the vicinity of the SEZ could result in disruption of breeding, migration, wintering, foraging, and other behavioral activities. Cumulative: Impacts to migratory birds could occur; depending on the number and location of other developments in the region. Data Gaps: Additional research needed on solar development impacts on migratory birds (and how far such impacts would extend away from the SEZ); impacts on migratory birds from construction and operational noise would have to be considered on a project-specific basis.	SEZ-specific programmatic design features require that if present prairie dog colonies (which could provide habitat or food resources for some bird species) will be avoided to the extent practicable; doing so would reduce impacts on associated bird species such as raptors. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf NEPA De Tilla Gulch SEZ Specific Design Features: SRMS ER2-6: Consider the applicability of guidelines developed by the Avian Power Line Interaction Council.	See other programmatic design features at URL under Avoidance column. SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS ER2-8: Evaluate construction timing restrictions in project-level NEPA alternatives to further reduce impacts. Timing limitation should be enforced from May 15-July 15 for any surface disturbing activities to protect migratory bird nesting and brood rearing, SRMS ER2-9: Conduct Raptor nest surveys should be conducted within a 0.5-mile radius of the project site, If any raptor nests are located, appropriate timing limitations should be applied. SRMS ER2-10: Conduct Migratory bird monitoring in the De Tilla Gulch SEZ should be conducted.	Yes. Some level of bird injury/fatality has been observed for all types of solar facilities (through collisions with equipment or from burns). Research is ongoing to quantify impacts and identify effective mitigation measures.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Plant Special Status Species Section 10.2.12	Direct: Ground disturbance, land clearing and grading, fugitive dust generated by project activities, and the spread of invasive species would result in loss of special status plant species habitat, if present, and might result in loss of individual plants. See also impact summary above under Vegetation and Riparian Areas. No Endangered Species Act (ESA)-listed or BLM-listed plant species have been identified that have suitable habitat within the SEZ. Indirect: Indirect impacts to individuals and habitat could occur from groundwater depletions, surface runoff, dust, or accidental spills. No Endangered Species Act (ESA)-listed plant species have been identified to have indirect impacts from solar development. BLM local biologists indicate that rock-loving aletes, a BLM-sensitive species, may have suitable habitat within 5 mi (8 km) of the SEZ. Cumulative: There could be cumulative impacts on some special status plant species due to habitat destruction and overall development and fragmentation of the area. Data Gaps: Although habitat for listed species has not been identified within the SEZ, pre-disturbance surveys are required to identify the presence and abundance of special status species.	The following programmatic design features for avoidance will be required: Based on data from pre-disturbance surveys, disturbance to occupied habitats will be avoided to the extent practicable per BLM Manual 6840. Disturbance of wetland and riparian habitat within the SEZ will be avoided or minimized to the extent practicable. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf See also avoidance measures listed for Vegetation and Riparian Areas, which would apply for Plant Special Status Species as well.	The following programmatic design features for minimization will be required: If avoidance is not possible for some species, translocation of individuals from areas of direct effects or compensatory mitigation (for example, through seed collection or reseeding at an appropriate offsite location) may be employed. Groundwater withdrawals will be avoided or limited to reduce impacts on groundwater-dependent special status species, including those species that may occur in riparian or aquatic habitats supported by groundwater. See other programmatic design features at URL under Avoidance column. See also minimization measures listed for Vegetation and Riparian Areas, which would apply for Plant Special Status Species as well.	Maybe. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ. Development in the SEZ would result in alteration of up to 1,064 acres of habitat. If present, little can be done onsite to mitigate the loss of special status plant species that may be present within the SEZ. Avoidance of individual plants may not be practical.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Animal Special Status Species Section 10.2.12	Direct: Ground disturbance, land clearing and grading, and fugitive dust generated by project activities would result in loss of special status animal species habitat, if present, and might result in loss of individual animals. See also impact summaries above under Terrestrial Wildlife and Migratory Birds. Development on the SEZ could directly disturb individuals or habitat for seven BLM-Colorado sensitive special status animal species (including western burrowing owl and Gunnison prairie dog). Indirect: Indirect impacts to individuals and animal habitat outside of the SEZ could occur due to groundwater depletions, surface runoff, dust, noise, lighting, or accidental spills. Potential for adverse impacts from new roads and increased traffic. Suitable habitat for three additional ESA-listed endangered or candidate/proposed endangered species (Southwestern willow flycatcher, western yellow-billed cuckoo, and Gunnison sage-grouse) and four additional BLM-sensitive animal species occurs within 5 mi (8 km) of the SEZ boundary. Cumulative: There could be cumulative impacts on some special status animal species due to habitat destruction and overall development and fragmentation of the area. Data Gaps: Pre-disturbance surveys are required to identify the presence and abundance of special status species.	The following programmatic design features for avoidance will be required: Based on data from pre-disturbance surveys, disturbance to occupied habitats will be avoided to the extent practicable per BLM Manual 6840. Disturbance of wetland and riparian habitat within the SEZ will be avoided or minimized to the extent practicable. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf See also avoidance measures listed for Terrestrial Wildlife and Migratory Birds, which would apply for Animal Special Status Species as well.	The following programmatic design features for minimization will be required: If avoidance is not possible for some species, augmentation, reintroduction, or translocation of individuals from areas of direct effects or compensatory mitigation may be employed. Groundwater withdrawals will be avoided or limited to reduce impacts on groundwater-dependent special status species, including those species that may occur in riparian or aquatic habitats supported by groundwater. *See endnote* [ii]	Yes. Extent of site grading and disturbance to native vegetation would be primary driver of residual impact to functional habitat for full build-out of SEZ.

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Environmental Justice Section 10.2.20	Direct: Based on guidelines from the Council on Environmental Quality, there are low-income or minority populations within a 50-mile (80-km) radius and potentially downwind of the SEZ. Communities and neighborhoods nearby to the De Tilla Gulch SEZ have higher minority populations relative to the Colorado average (41% vs 30% minority) and have higher proportion of low-income population relative to the state average (52% vs 30% low income; EPA EJ Screen Reports, 2015). SEZ dust would burden low income and minority populations in Conejos County at proportionately higher levels relative to other Colorado populations. Additional adverse impacts that might disproportionately affect minority and low-income populations include noise; reduced water quality and availability for agricultural and ranching water users; the visual impacts of solar energy facilities; negative effects on heritage livestock grazing; restricted access to land used for economic, recreation, cultural, sustenance hunting, or religious purposes; and effects on property values. Also, surface runoff, related erosion, and weed introduction could burden low income and minority populations and non-federal costs of service (i.e., weed control) in Conejos County at a higher proportion relative to other Colorado populations. The *benefits* of BLM solar energy development to low income and minority population in Saguache County may include some local employment opportunity and expanding integration with the regional renewable energy sector. Indirect: Projects could impose indirect costs to county services (roads, schools, clinic, etc.). . Cumulative: The economic and environmental benefit of De Tilla Gulch SEZ development would accrue to a larger national public, including Saguache County. However, certain economic and environmental burdens would be greater on Saguache County than to a comparative county along the Front Range of Colorado. Cumulative contributions to the economy and environment from solar development could be moderated by offset compensation investments. Data Gaps: County government tax revenue from improvements on federal land (Source: Colorado Division of Property Taxation).	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Environmental_Justice.pdf SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS AQC2-2: Avoid construction during times of high dust emissions from other sources (e.g., agricultural plots) should also be considered. SRMS AQC2-3: The SEZ solar project Vegetation Management Plan should be required that includes the maintenance of the maximum acreage of native vegetation cover practicable during construction and operation to avoid dust sources.	Programmatic design features for air quality include a requirement to implement dust suppression measures during construction and operations. See other programmatic design features at URL under Avoidance column. SRMS Project-level NEPA Recommendations SRMS-AQ3: Evaluate solar panel mounting and other disturbance minimizing technologies in project-level NEPA alternatives (e.g. no grading of the site, retention of maximum native vegetation, use of low emission vehicles, placing gravel on roads, use of "drive and crush" installation).	Yes. SEZ development as a public land use in Saguache County, including associated federal revenues generated and residual environmental impacts, will be cumulative to historic forces that have contributed to a rural people's economic status. The 21st-century BLM solar energy development benefit and burden impact to low income and minority people includes their relationship with the federal government.

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Hydrology: Surface Water and Water Quality Section 10.2.9	Direct: Land clearing, land leveling, vegetation removal, groundwater use, and spills and runoff associated with development of the SEZ have the potential to alter flow routing change surface runoff, reduce infiltration/recharge, cause loss of ephemeral stream networks, reduce evapotranspiration rates, increase sediment transport (by water), change sediment transport (by wind), and degrade water quality. No permanent surface water bodies are located within the De Tilla Gulch SEZ. Several intermittent/ephemeral drainages cross the area from the northwest to the southeast and may be subject to intermittent flooding. Indirect: Indirect impacts from development and groundwater use on ephemeral and perennial surface water features could occur. Cumulative: Alterations to ephemeral stream networks can alter groundwater recharge and surface runoff processes potentially impacting the basin-scale water balance and water quality aspects of water features receiving surface runoff. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Water.pdf <u>SRMS Project-level NEPA Analysis Recommendations</u> <u>SRMS WR1:</u> Project-level NEPA alternatives should evaluate maintenance of existing flow patterns at the site boundary, by avoiding ephemeral drainages and/or providing detention and/or retention facilities. To avoid any impact to downstream properties, detention can be provided on the SEZ to capture the volume of flow that is represented by the increase between existing and proposed conditions. Retention could be utilized to capture all the additional flow volume with little to no overland surface water release. <u>SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features:</u> <u>SRMS WR2-2</u>: The Vegetation Management Plan should include the maintenance of the maximum acreage of native vegetation cover practicable during construction and operation, and minimization of land disturbance in ephemeral washes and dry lakebeds.	See programmatic design features at URL under Avoidance column. Additionally, all release points along the SEZ boundary should be designed to avoid erosion. Along County Road AA, all release points will require a new culvert, bridge crossing or a dip crossing. See additional surface water impact avoidance and minimization measure recommendations in BLM Solar Energy Zone Hydrology – De Tilla Gulch SEZ (Tetra Tech, April 2014)	Yes Development of the SEZ may alter ephemeral stream channels that can impact runoff and groundwater recharge. Reductions to the connectivity of these areas with surface waters and groundwater could limit water availability and thus alter the ability of the area to support vegetation growth and diversity, generating critical habitat areas and connecting wildlife corridors.

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Hydrology: Groundwater Quality and Groundwater Availability Section 10.2.9	Direct: De Tilla Gulch SEZ is located in the Rio Grande Headwaters sub-basin. Groundwater withdrawals for development may cause declines in groundwater elevations that can impact water availability for surface water features, vegetation, ecological habitats, regional groundwater flow paths, and other groundwater users in the basin. Spills associated with development of the SEZ have the potential to degrade groundwater quality. Indirect: Groundwater withdrawals for solar energy facilities have the potential to affect other groundwater users in the basin. Cumulative: Groundwater depletion has continued in the San Luis Valley aquifer system since 1950 due to withdrawal for agricultural and other purposes. Groundwater use for solar energy development may result in additional use of groundwater. However, the strict management of water resources in the Rio Grande Basin acts to ensure that any impacts from a new water use would continue to be equivalent to or less than those from current uses and that no net increase in the total amount of water used would occur. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Water.pdf SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features: SRMS WR2-3: if project-specific impacts to groundwater are identified, purchase of existing water rights must be evaluated to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table. See additional groundwater impact avoidance measures in BLM Solar Energy Zone Hydrology – De Tilla Gulch SEZ (Tetra Tech, April 2014)	Programmatic design features regarding intermittent/ ephemeral water bodies and storm water management emphasize the need to maintain groundwater recharge for disturbed surface water features within the De Tilla Gulch SEZ. Augmentation/compensation is required by the State of Colorado. See other programmatic design features at URL under Avoidance column.	Yes The nature of the solar technology deployed will dictate water requirements. Dependent on compensation requirements, on the water demands of the development, and whether the subsurface hydrology is affected. Onsite mitigation will reduce, but will not eliminate the need for water.
Lands & Realty Section 10.2.2	Direct: Development of the SEZ could disturb 1,064 acres (4.3 km^2). Rights-of-way authorizing different uses have been granted by BLM on the public lands within the SEZ, including two 115-kV power lines, a county road, and a fiber optic line. A BLM-designated transmission corridor covers most of the SEZ. The SEZ boundary will isolate an area of about 458 acres (1.9 km^2) between the SEZ and the highway, fragmenting the public land in the area and making the isolated public land parcel more difficult to manage. Indirect: Increased traffic and increased access to previously remote areas also could change the overall character of the landscape. Public land availability to solar developers under constrained regional transmission infrastructure and power purchase agreement markets could conceivably indirectly impact private land markets and county revenues. Cumulative: The contribution to cumulative impacts of utility-scale solar projects on public lands on and around the De Tilla Gulch SEZ could be significant, particularly if the SEZ is fully developed with solar projects. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Lands_and_Realty.pdf	See programmatic design features at URL under Avoidance column.	No. By regulation, any new activity must occur in deference to existing rights. Thus, potential impacts have been avoided.

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Livestock Grazing Section 10.2.4.1	Direct: Solar development within the SEZ would cancel the Crow Allotment. The allotment has not been grazed by the permittee for about 10 years because of inadequate fencing to control livestock movement. One well is present. However, the permittee would lose the ability to sell the allotment. The county would lose tax revenues (minor impact), and BLM would also lose some revenue. Indirect: None identified. Cumulative: Reductions to available seasonal grazing resulting from SEZ development would be cumulative to economic impacts to ranching families from drought-imposed forage conservation measures on public lands and broader trends to economic viability of ranching as a result of long-term variability in rangeland productivity from increasing temperature and dryness as climate change models predict for the region. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Rangeland_Resources.pdf	See programmatic design features at URL under Avoidance column.	Maybe. If development occurs within existing grazing allotments, little can be done onsite to mitigate the loss to the allotments and the loss of grazing. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA.
Military & Civilian Aviation Section 10.2.6	Direct: The SEZ is located under a Special Use Airspace and is identified by the BLM as an area of required consultation with the Department of Defense. In comments on the Solar PEIS, the military indicated that at that time it had no concerns about potential impacts on its activities associated with solar development. The SEZ is also located about 8 mi (12 km) from the Saguache Municipal Airport. Indirect: None identified. Cumulative: Cumulative impacts would be small. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Military_Civilian_Aviation.pdf	Coordination with the military will be required on a project-specific basis to ensure that solar facilities do not interfere with operations. See other programmatic design features at URL under Avoidance column.	No. In comments on the Solar PEIS, the military indicated that at that time it had no concerns about potential impacts on its activities associated with solar development.
Minerals Section 10.2.8 and Section 10.2.24 of the Final PEIS	Direct: The SEZ does not contain existing oil and gas leases, mining claims, or geothermal leases. The SEZ has been withdrawn from receiving new mining claims for a period of 20 years, precluding impacts from many types of mining activities. Indirect: None identified. Cumulative: None identified. Data Gaps: None identified.	Not applicable	Not applicable	No

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Native American Concerns Section 10.2.18	Direct: It is likely that some plants traditionally important to Native Americans will be destroyed and that habitat of traditionally important animals will be lost. No direct impacts from disturbance during project development would likely occur to known culturally significant areas (i.e., San Luis Lakes, the Great Sand Dunes, and Blanca Peak). Indirect: Indirect visual and auditory impacts are possible. For example, it is possible that there will be Native American concerns about potential visual effects and the effects of noise from solar energy development in the SEZ on Blanca Peak. General habitat loss with vegetation clearing and water reduction could affect species and ecosystem health. Cumulative: It is possible that the development of utility-scale solar energy projects in the SEZ, when added to other potential projects likely to occur in the area, could contribute cumulatively to visual impacts in the valley as viewed from Blanca Peak and to the loss of traditionally important plant species and animal habitat. Data Gaps: Government-to-government consultation will be required to determine issues of Native American concern.	The following SEZ-specific programmatic design features for avoidance will be required: Known human burial sites and rock art (panels of petroglyphs and/or pictographs) will be avoided. Where there is a reasonable probability of encountering undetected human remains and associated funerary objects by a solar project, the BLM will carry out discussions with Indian tribes before the project is authorized, in order to provide general guidance on the treatment of any cultural items that might be exposed. Visual intrusion on sacred sites will be avoided to the extent practicable. Springs and other water sources that are or may be sacred or culturally important will be avoided to the extent practicable. Culturally important plant and wildlife species will be avoided to be extent practicable. Culturally important plant and wildlife species will be avoided to be extent practicable. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Native_American_Concerns.pdf	See programmatic design features at URL under Avoidance column.	Yes. Residual impacts to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and coordination with tribes.

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Paleontology Section 10.2.16	Direct: There is some potential that the Alamosa Formation is present. Direct impacts are possible, but none have been identified at this time (see Data Gaps). Indirect: None identified. Cumulative: Cumulative impacts would be dependent on whether significant resources are found within the SEZ and in additional project areas in the region. Data Gaps: A more detailed look at the geological deposits is necessary to determine whether a paleontological survey is warranted. The PFYC for Quaternary gravels is Class 3b, which indicates that the potential for significant fossil materials to occur is unknown and needs to be investigated further.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Paleo.pdf	Programmatic design features require that the BLM will be notified immediately upon discovery of fossils. Work will be halted at the fossil site and continued elsewhere until qualified personnel, such as a paleontologist, can visit the site, determine the significance of the find, and, if significant, make site specific recommendations for collection or other resource protection. See other programmatic design features at URL under Avoidance column.	No. Any paleontological resources that are discovered will be preserved.
Recreation Section 10.2.5	Direct: Solar development will preclude current recreational activities that may occur within the SEZ boundary. There are no OHV Open Areas or Designated Routes within the SEZ, although there may be limited use of dirt roads within the area for backcountry driving which would be lost with solar development. There may be some occasional use of the area by small game hunters. Only a small impact to pronghorn antelope hunting is likely because only a small portion of available habitat occurs within the SEZ. Lost recreation opportunities can readily be replaced at nearby locations. Indirect: Indirect effects could occur on lands near the solar facilities or on viewsheds of surrounding areas and would result from the change in the overall character of undeveloped BLM-administered lands to an industrialized, developed area, displacing people who are seeking more rural or primitive surroundings for recreation. Great Sand Dunes National Park and Preserve, the Old Spanish National Historic Trail, the Los Caminos Antiguos Scenic Byway, the proposed Cochetopa Scenic Byway, the Sangre de Cristo Mountains, three national wildlife refuges, and numerous designated wilderness areas are among the highlights of the recreational and tourism opportunities of the area. Cumulative: Multiple developments in the vicinity of the SEZ could cumulatively reduce recreational opportunities. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Public_Access_and_Recreation.pdf	SEZ-specific programmatic design features require that as projects are proposed for the SEZ, the potential impacts on tourism will be considered and reviewed with local community leaders. If vehicle routes currently open within the SEZ are closed or rerouted, alternative routes may be established. See other programmatic design features at URL under Avoidance column.	Maybe. Relatively little recreation currently occurs in the SEZ. If new vehicle routes are established, a NEPA analysis would be required for those routes.

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Socioeconomics Section 10.2.19	Direct: Beneficial impacts on the local economy as a result of expenditures of wages and salaries and the collection of state sales and income taxes (from the workforce as well as property tax revenue from the construction of these facilities). Construction-related jobs would be temporary and the number of jobs would depend on the technology, number of facilities constructed concurrently, and size of each facility. Operational jobs will be more permanent and the number of jobs also depends on the type of technology and size of each facility). The adverse impacts, including county and/or state government costs, could occur locally or regionally due to the need for services for new workers during project construction and operation (e.g., housing, police, fire-fighters). Indirect: Beneficial impacts on the local economy as project wages and salaries, procurement expenditures, and tax revenues circulate through the economy of each state, thereby creating additional employment, income, and tax revenues. Indirect construction and operations jobs would depend on the technology, number of facilities constructed concurrently, and size of each facility. Beneficial impacts would be minor. The allotment that overlaps the SEZ is not currently used. However, restricted land use from solar energy development could result in the loss of livestock grazing (including loss of jobs) a decline in grazing fees payable to the BLM and the county, and reduced opportunities for recreation and tourism (including economic impacts).. Public land availability to solar developers under constrained regional transmission infrastructure and power purchase agreement markets could conceivably indirectly impact private land markets and county revenues due to competition for transmission availability. Water requirements for De Tilla SEZ solar development would represent a new industrial use in a Colorado water resource sub-district in the Conejos River basin that is currently constrained and under review in State of Colorado water court. New utility-scale uses could indirectly affect agricultural water users and markets. If hunting in or near the SEZ declines due to solar development, there could be a loss of revenue to the State due to fewer issued hunting licenses. Cumulative: Beneficial impacts overall would include creation of additional jobs and income. The negative impacts, including some short-term disruption of rural community quality of life, would likely be short-term and/or specific to individual projects on the SEZ. Data Gaps: Additional information on extent of disruption of rural community quality of life.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Socioeconomics.pdf	See programmatic design features at URL under Avoidance column. <u>SRMS Recommended Project-Level NEPA De Tilla Gulch SEZ Specific Design Features:</u> <u>SRMS S1-2:</u> Onsite mitigation could include requiring developers to secure agreements for local government services as a condition of "Notice to Proceed".	Maybe. See Environmental Justice. For grazing impacts, depending on mitigation measures implemented on the basis of project-level NEPA. No shared revenue to state and local government from federal land rental and MW usage fees under current federal law and regulations

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Soils/Erosion Section 10.2.7	Direct: Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling), especially during the construction phase of a solar project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. Soils within the SEZ are gravelly to gravelly sandy loams of the Rock River and Graypoint Series, which together make up about 75% of the soil coverage at the site. Soil contamination from spills could occur. Disturbance of soils (particularly subsurface calcic soils) may produce fugitive dust. Indirect: Disturbance of soil can lead to introduction of invasive species. Elevated PM levels could result from soil disturbance/grading activities during construction. Cumulative: Cumulative impacts would occur from the disturbance of several large renewable energy projects, connecting linear facilities, and other projects in the vicinity of the SEZ, but would limited through the application of design features. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Soil_Geologic_Hazards.pdf In addition, a Vegetation Management Plan should be required that includes the maintenance of the maximum acreage of native vegetation cover practicable during construction and operation to avoid dust sources.	See programmatic design features at URL under Avoidance column.	Yes. Level of site grading would be primary driver of residual impact for full build-out of SEZ. Little can be done to mitigate the loss of up to 1,064 acres of soil. Avoidance (not developing some areas) will reduce the acreage and soil stabilization measures can reduce soil erosion post disturbance.

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		Avoidance	Minimization	
Specially Designated Areas - General Section 10.2.3	Direct: Specially designated areas (SDAs) within 25 miles (40 km) of the SEZ that could be impacted by solar development include the following: Black Canyon WSA, Continental Divide National Scenic Trail, Sangre de Cristo Wilderness Area, and several U.S. Forest Service roadless areas, Great Sand Dunes National Park, Preserve, and Wilderness, Baca National Wildlife Refuge, Old Spanish National Historic Trail, Penitente Canyon SRMA, and the Sangre de Cristo National Heritage Area. Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing, and annoyance from glint and glare), reduced recreation use, fragmentation of biologically linked areas, and loss of public access. Because the Old Spanish National Historic Trail is within 0.25 mi (0.4 km) of the SEZ, it is anticipated that solar development on the SEZ would impact the Trail. The magnitude of these impacts (primarily visual) would depend on the integrity and historical significance of the segment of the Trail from which solar development could be seen. The other SDAs are distant from the SEZ and only minor impacts on their viewsheds would be associated with SEZ development. The Baca National Wildlife Refuge function relies on water availability, and so water use by solar technologies is a concern. However, water use is controlled (see Hydrology: Groundwater Availability). Indirect: None identified. Cumulative: Development of solar facilities and other facilities may result in cumulative effects, particularly visual impacts on SDAs. Data Gaps: For projects in the De Tilla Gulch SEZ that are located within the viewshed of the Old Spanish National Historic Trail, a National Trail inventory will be required to determine the area of possible adverse impact.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/SDAs_and_LWC.pdf	See programmatic design features at URL under Avoidance column.	Yes (for Old Spanish National Historic Trail). Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA. For visual impacts, full development of the SEZ with solar facilities would cause moderate to strong visual contrasts that could not be hidden from view from the specially designated areas.

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Specially Designated Areas - Lands with Wilderness Characteristics Section 10.2.3	Direct: A recently maintained inventory of wilderness characteristics of public lands within the SEZ found that these lands do not contain wilderness characteristics Indirect: None; no nearby land meeting criteria for wilderness characteristics have been identified Cumulative: Cumulative impacts would be possible if lands with wilderness characteristics were identified in the vicinity of the SEZ. Data Gaps: None identified.	Programmatic design features include a requirement to consider options to avoid, minimize, and/or mitigate impacts to lands with wilderness characteristics as part of the project-specific environmental impact analysis, in coordination with the BLM. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/SDAs_and_LWC.pdf	See programmatic design features at URL under Avoidance column.	No,
Transportation and Public Access Sections 10.2.2 and 10.2.21	Direct: Development will add traffic to existing roads serving the area. U.S. 285 provides a regional traffic corridor that could experience moderate impacts for construction of single projects. This would represent up to approximately two times the traffic for U.S. 285, or up to approximately three times the amount of traffic currently using State Highway 17. Local roads would also be impacted. Glint and glare from solar facilities may affect aircraft pilots, motorists on nearby roads, or crew/passengers on nearby railways. Indirect: Potential for adverse impacts to wildlife from new roads and increased traffic (see Ecology-Wildlife section). Cumulative: Cumulative impacts to traffic could occur with multiple developments in the region. Data Gaps: None identified.	Programmatic design features for visual resources include a requirement to minimize glint and glare. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Transportation.pdf	The following SEZ-specific programmatic design features for minimization will be required: Public access to roads will be maintained through transportation management plan. Local roads improvements will be made to accommodate additional traffic. Construction activities will be planned to minimize impacts (e.g., send trucks in tandem). See other programmatic design features at URL under Avoidance column.	No. Through a combination of avoidance, design features, and the establishment of alternative access routes to these areas, the potential impacts to transportation can be adequately mitigated.

Resource/ Issue	De Tilla Gulch SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Visual Section 10.2.14	Direct: The Visual Resource Inventory (VRI) values for the SEZ and immediate surroundings are VRI Class III, indicating moderate visual values. Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare). The Solar PEIS identified strong visual contrasts for the SEZ itself, along the Old Spanish National Historic Trail, and on U.S. 285, part of which is also the proposed Cochetopa Scenic Byway. Indirect: None identified. Cumulative: If several projects become visible from one location or in succession as viewers move through the landscape (such as driving on local roads, these cumulative impacts may make the area less visually appealing. Data Gaps: Additional data from key observation points may be needed.	SEZ-specific programmatic design features state that the development of power tower facilities within the SEZ should be prohibited. Additionally, there is a requirement to minimize glint and glare. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Visual.pdf	See programmatic design features at URL under Avoidance column.	Yes. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA, While onsite mitigation would reduce visual contrasts caused by solar facilities within the SEZ, it would not likely reduce impacts to less than moderate or strong levels for nearby viewers.
Wild Horses and Burros Section 10.2.4.2	There are no designated wild horse and burro herds present in the areas. There would be no effect on designated wild horse and burro herds from solar energy development of the SEZ. Data Gaps: None identified.	Not applicable	Not applicable	No

Endnotes:

[i] Ecology – Terrestrial Species (continued):

Fencing around the solar energy development should not block the migratory corridors of mammals, particularly big game species.
Sediment and erosion controls will be implemented along intermittent drainages that drain toward Saguache or San Luis Creeks and the wetlands in the vicinity of the SEZ.
See other programmatic design features at URL under Avoidance column.

[ii] Ecology: Animal Special Status Species (continued):

Consultations with the USFWS and CO Division of Wildlife will be conducted to address the potential for impacts on the Gunnison's prairie dog.
See other programmatic design features at URL under Avoidance column.
See also minimization measures listed for Terrestrial Wildlife and Migratory Birds, which would apply for Animal Special Status Species as well.

BLM Colorado-New Mexico Summary of Resource Impacts (Includes Degree of Onsite Mitigation and Recommendations for Project-level NEPA Analysis, and Assessment of Residual Impacts for Los Mogotes East Solar Energy Zone

Location: Southeast Conejos County, Colorado, BLM San Luis Valley Field Office – 2,650 developable acres, up to 424 MW generation capacity.

Sources: Summarized from Draft and Final Solar PEIS for the SEZ (http://blmsolar.anl.gov/sez/co/los-mogotes-east/) with BLM Interdisciplinary Team (IDT) input.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Acoustics Section 10.4.15[4]	Direct: Increased noise levels during construction and operation of solar facilities with thermal energy storage (TES) could cause noise levels slightly exceeding the EPA guideline of 55 dBA at the nearest residences (about 0.4 mi [0.6 km] to the north and east), particularly for activities near the eastern SEZ boundary. The EPA guideline could also be exceeded due to operation of facilities with TES at the West Fork of the North Branch of the Old Spanish Trail segment under study (about 1.0 mi [1.6 km] to the east of the SEZ). A level of 55 dBA is similar to the noise of an air conditioning unit at 100 ft. Noise impacts during operation of PV facilities would be minimal. Indirect: Based on Solar PEIS modeling, increased noise levels during construction and operations occurring near the southwestern SEZ boundary are not expected to affect terrestrial wildlife in the Los Mogotes ACEC. Cumulative[5]: If multiple facilities were to be constructed close to the SEZ, residents and/or wildlife nearby could be affected by the noise generated, particularly at night when the noise is more discernible due to relatively low background levels. Data Gaps[6]: Impacts on wildlife from construction noise needs to be considered on a project-specific basis. Refined modeling and background measurements would be needed.	Programmatic design features include a requirement that projects will be designed to locate solar facilities far enough away from residences, or include engineering and/or operational methods, such that county, state, and/or federal regulations for noise are not exceeded. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Noise.pdf	Programmatic design features include a requirement to limit the hours of daily activities, construct noise barriers if needed and practicable, and coordinate with nearby residents. See other programmatic design features at URL under Avoidance column. <u>SRMS Project-level NEPA Recommendation: A-1</u> Evaluate construction timing restrictions in project-level NEPA alternatives to further minimize effects on wildlife (e.g., no construction during breeding season or in winter use concentration areas/critical winter range).	Maybe. Cumulative effects to terrestrial wildlife, birds, bats. Generally, impacts from solar development are expected to be temporary, localized, and readily mitigated. Technology used and onsite mitigation implemented would be primary driver of residual impact for full build-out of SEZ.

The residual or unavoidable impacts assessment assumes BLM-DOE Solar PEIS (ROD, 2012) analysis and 80% of the SEZ area will be used for solar development.

[2] These columns give examples of avoidance and minimization measures that are specified in the Record of Decision for the Final Solar PEIS and will be required. Additional avoidance and minimization measures proposed by the BLM IDT are listed and should be evaluated through project-specific environmental analyses. Monitoring is planned to verify the implementation and effectiveness of avoidance and minimization measures.

[3] Residual or unavoidable impacts are residual effects that cannot be adequately mitigated onsite by avoidance and/or minimization. Preliminary assessments are provided for comment.

[4] Section numbers are the same in both the Draft and Final Solar PEIS.

[5] Sections 10.4.22.4 of the Draft and Final Solar PEIS address cumulative impacts, which consider ongoing and reasonably foreseeable activities in the vicinity of the SEZ such as wind, geothermal, mining, agricultural, and commercial development; new roads, traffic, and off-highway vehicle use; and infrastructure such as transmission lines, and fences.

[6] Data gaps have not been identified for all resources in this table. Additional data gaps may be identified during future SEZ- or project-specific assessments.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Air Quality Section 10.4.13	Direct: Fugitive dust and equipment exhaust emissions during construction could result in short-term exceedance of National Ambient Air Quality Standards (NAAQS) for particulate matter (PM) in SEZ vicinity. Predicted 24-hour PM_{10} concentration levels could exceed AAQS at the nearest residence during exceptional spring wind events. Disturbance of soils (particularly subsurface calcic soils) may produce construction-phase fugitive dust, particularly during exceptional wind events during spring, which may result in exposure to respirable particulates and/or microbes (human health impacts). Indirect: New SEZ source suspended PM could temporarily contribute to regional seasonal spikes in asthma and other respiratory ailments in a Colorado airshed with the highest proportion of low income and minority populations on a county basis. Decreased visibility in nearby residential (as close as 0.4 mi [0.6 km] to the north and east) or specially-designated areas due to elevated PM levels from soil disturbance/grading during construction. Increased PM would also increase dust-on-snow accumulation, possibly contributing to changes in stream runoff patterns. If used for dust abatement, magnesium chloride could be harmful to plants (due to increased chloride ions in runoff). Cumulative: Los Mogotes East and Antonito Southeast SEZs are within about 12 mi (19 km) of each other; construction of solar facilities at the two SEZs could have cumulative impacts with respect to generation of PM in a region of Colorado with monitored Max 24-hr PM10 exceeding PM10 NAAQS (peak concentration range ~140-600 mg/m^3, 2002-2013; Chang et al. 2016). New SEZ dust sources would be cumulative to extensive fallow irrigated agricultural circles and unpaved roads with respect to generation of PM and associated health impacts. Data Gaps: Monitoring for PM during all phases of development will be required to identify levels exceeding AAQS.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Air_Quality_Climate.pdf. SRMS Project-level NEPA Recommendations: SRMS AQ1: Explicitly compare design, construction and operation measures in range of NEPA alternatives to evaluate on-site dust generation avoidance effectiveness. SRMS Recommended Project-Level NEPA Los Mogotes East SEZ Specific Design Features: SRMS AQC2-2: Avoid construction during times of high dust emissions from other sources (e.g., agricultural plots). SRMS AQC2-3: The SEZ solar project Vegetation Management Plan will quantify site baseline soil protective cover and set project construction and operation-phase ground-level wind surface friction control targets beneath and surrounding solar arrays to reduce dust generation.	Programmatic design features include a requirement to implement dust suppression measures during construction and operations. See other programmatic design features at URL under Avoidance column. SRMS Project-level NEPA Recommendations SRMS-AQ3: Evaluate solar panel mounting and other disturbance minimizing technologies in project-level NEPA alternatives (e.g. no grading of the site, retention of maximum native vegetation, use of low emission vehicles, placing gravel on roads, use of "drive and crush" installation). SRMS Recommended Project-Level EPA Antonito Southeast SEZ Specific Design Features: SRMS AQC2-4: SEZ Re-vegetation of the SEZ with native vegetation to increase soil stability as a plan of development feature to further minimize the amount of grading and surface disturbance and promote reduced dust emissions and PM levels.	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Climate Change Section 5.11.4 of DPEIS for soil storage capacity; 10.4.13 for emissions avoided	Direct: Possible impact through loss of carbon storage capacity of the soil (estimated at 100 g carbon/m^2). Preliminary calculations show loss of CO_2 storage capacity as 1.6 tons/acre/yr (3,392 tons/yr for SEZ full build-out), less than 1% of the CO_2 emissions avoided by operation of a solar facility (see below). Positive impact: Solar power generation reduces demand for energy from fossil fuels, and thereby reduces greenhouse gas emissions (from about 408,000-734,000 tons/yr CO_2 avoided at full build out depending on technology). Indirect: If PM is highly elevated and results in increased dust-on-snow accumulation effects of climate change may be exacerbated (through early and/or fast stream run-off coupled with decreased snowpack). Cumulative: Over the long term, the development of solar energy contributes to reduced greenhouse gas emissions, if the development offsets electricity generation by fossil fuel plants). About 90% of electricity in CO is produced in fossil fuel plants. Data Gaps: None identified.	See programmatic design features for vegetation at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf Recommended Project-Level NEPA Los Mogotes SEZ Specific Design Features: SRMS AQC2-3: The SEZ solar project Vegetation Management Plan will quantify site baseline protective soil cover and set project construction and operation-phase ground-level wind surface friction control targets beneath and surrounding solar arrays to reduce dust generation.	See programmatic design features at URL under Avoidance column.	No.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Cultural Section 10.4.17	Direct: Direct impacts on eligible archaeological sites (if present) and on the West Fork of the North Branch of the Old Spanish Trail segment under study are possible (see data gaps). Indirect: Impacts on significant cultural resources and cultural landscapes associated with American Latino heritage, such as within the Sangre de Cristo National Heritage Area, are possible throughout the San Luis Valley. Impacts on significant cultural resources and cultural landscapes associated with Native American groups are also possible. Erosion impacts on the cultural landscape outside of the SEZ resulting from land disturbances and modified hydrologic pattern, increased accessibility and potential for damage to eligible sites outside of the SEZ (if present). Cumulative: Dependent on whether eligible sites are found and impacted in the SEZ and adjacent areas. Data Gaps: While no sites have been identified in the SEZ, many significant archaeological sites have been located in close proximity. A pre-development cultural inventory and evaluation will be completed, as part of the Section 106 consultation process. Additional investigation of the location, integrity, and the significance of portions of the West Fork of the North Branch of the Old Spanish Trail segment under study from which future potential development in the SEZ could be viewed (which may include archival research, archaeological investigation, and viewshed analysis) is needed to determine whether adverse impacts on the Trail would occur.	Programmatic design features require that significant cultural resources clustered in specific areas which retain sufficient integrity will be avoided. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Cultural.pdf Recommended Project-Level NEPA Los Mogotes SEZ Specific Design Features: SRMS-CR2-2: For projects located within the viewshed of the West Fork of the North Branch of the Old Spanish Trail segment under study, further study is needed, which may include archival research, archaeological investigation, and viewshed analysis, to determine the area of possible adverse impact on resources, qualities, values, and associated settings of the Trail; to identify measures to prevent substantial interference; and to determine and avoid any areas unsuitable for development.	Programmatic design features require that a Memorandum of Agreement will be developed and executed if eligible sites are discovered within the SEZ to determine how the eligible properties will be treated (avoided or mitigated to minimize impacts). See other programmatic design features at URL under Avoidance column.	Maybe. The discovery of new cultural sites is always a possibility, and adequate mitigation would be dependent on the resources discovered and their relative significance in the region. Residual impacts to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and coordination with stakeholders (federal, state, and local agencies, tribes, and public). In addition, impacts to non-renewable resources are both irretrievable and irreversible.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Vegetation and Riparian Areas Section 10.4.10	Direct: Development will adversely affect characteristic vegetation (e.g., shadscale, fourwing saltbush, and greasewood) through destruction and loss of habitat. Development will result in small impacts to the Inter-Mountain Basins Semi-Desert Shrub Steppe land cover type which comprises 99% of the SEZ. Sensitive habitats on the SEZ include ephemeral washes. Development, including vegetation removal, land clearing, grading, dust deposition, and lowered groundwater levels, may alter soils and vegetation communities. Indirect: There may be loss of native vegetation outside the SEZ due to dust deposition from construction and operations, increased surface water runoff and related erosion, or through the introduction of invasive species. Cumulative: Solar energy development could be a contributor to cumulative impacts on some vegetation communities, depending on the type, number, and location of other developments in the region. Data Gaps: None Identified.	SEZ-specific programmatic design features require that all dry wash habitats within the SEZ will be avoided to the extent practicable, and any impacts minimized and/or mitigated in consultation with appropriate agencies. A buffer area will be maintained around dry washes to reduce the potential for impacts on these habitats on or near the SEZ. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf SRMS Recommended Project-Level NEPA Los Mogotes East SEZ Specific Design Features: SRMS ER2-2: The Vegetation Management Plan should include the maintenance of the maximum acreage of native vegetation cover practicable, and compliance with applicable regulations and policies for the control of noxious weeds and invasive plant species (e.g., travel through weed-infested areas will be avoided; weeds will be treated, vehicles and machinery will be cleaned to remove weed seeds), to maintain ecological integrity and decrease the probability of wildfire.	SEZ-specific programmatic design features require that appropriate engineering controls be used to minimize impacts on dry wash, and riparian habitats, including downstream occurrences, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Maintaining sediment and erosion controls along drainages would reduce the potential for impacts on wetlands near or downgradient from the SEZ. Appropriate buffers and engineering controls will be determined through agency consultation. See other programmatic design features at URL under Avoidance column. SRMS Recommended Project-Level NEPA Los Mogotes East SEZ Specific Design Features: SRMS ER2-3: Evaluate solar panel mounting and other disturbance minimizing technologies (e.g., no grading of the site) in project-level NEPA alternatives. SRMS ER2-4: If project-specific impacts to groundwater are identified, purchase of existing water rights must be used to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table.	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ. Development would result in direct removal or disturbance of native plant communities and the ecosystem services they provide. Many impacts to riparian areas can be mitigated onsite by avoiding development in riparian areas and by the installation of engineering controls on surface water runoff/erosion.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology – Invasive and Noxious Weeds Section 10.1.10	Direct: Development, including vegetation removal, land clearing, grading, dust deposition, and lowered groundwater levels, may alter soils and vegetation communities and result in the establishment of invasive species and noxious weeds within the SEZ. Some weeds of concern include henbane, whitetop, Russian napweed, and Canada thistle. Indirect: There may be loss of native vegetation outside the SEZ due to the introduction of invasive species. Establishment of noxious weeds in the SEZ may result in spread of weeds to adjacent areas. Cumulative: Solar energy development could be a contributor to cumulative impacts on some vegetation communities, depending on the type, number, and location of other developments in the region. Data Gaps: Colonization rates of weed species.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf SRMS Recommended Project-Level NEPA Los Mogotes East SEZ Specific Design Features: SRMS ER2-2: The Vegetation Management Plan should be required that includes the maintenance of the maximum acreage of native vegetation cover practicable, and compliance with applicable regulations and policies for the control of noxious weeds and invasive plant species (e.g., travel through weed-infested areas will be avoided; weeds will be treated, vehicles and machinery will be cleaned to remove weed seeds), to maintain ecological integrity and decrease the probability of wildfires.	See programmatic design features at URL under Avoidance column. RMS Recommended Project-Level NEPA Los Mogotes East SEZ Specific Design Features: SRMS ER2-5: Conduct surveying and treating invasive weeds, including henbane, along access roads to the SEZ, and solar panel mounting and other disturbance minimizing technologies (e.g., no grading of the site) should be evaluated in project-level NEPA alternatives.	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ. Onsite mitigation will reduce, but not eliminate, the potential for invasive species establishment. The degree of disturbance creates a significant opportunity for the establishment of invasive species and weeds.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Terrestrial Wildlife Section 10.4.11	Direct: Loss of habitat and connectivity for several species of amphibians, reptiles, birds, invertebrates, and mammals including big game species (black bear, bighorn sheep, cougar, elk, mule deer, pronghorn, and bats). Ground disturbance, fugitive dust generated by project activities, noise, lighting, vegetation clearing, spread of invasive species, accidental spills, and harassment could impact wildlife within the SEZ, and may cause mortalities. Indirect: Outside the SEZ, impacts could occur from habitat loss or modification related to groundwater depletions, surface runoff, dust, noise, lighting, or accidental spills. Potential for adverse impacts from new roads and increased traffic. Increased noise levels in the vicinity of the SEZ could result in disruption of breeding, migration, wintering, foraging, and other behavioral activities. Cumulative: If development of solar facilities occurred at both Antonito Southeast and Los Mogotes SEZs, or if other actions occurred in the vicinity, there could be cumulative impacts on wildlife and aquatic biota habitat. Where projects are closely spaced, the cumulative impact on a particular species could be moderate to large. Data Gaps: Impacts on terrestrial wildlife from construction and operational noise would have to be considered on a project-specific basis. Research is needed on the required effective width of big game migration corridors through the Rio Grande del Norte National Monument and through the Los Mogotes East SEZ.	The following SEZ-specific programmatic design features for avoidance will be required: Wash habitats within the SEZ will be avoided to the extent practicable. Prairie dog colonies (if present) will be avoided to the extent practicable; doing so would reduce impacts on associated mammalian and avian species such as desert cottontail, burrowing owl, and thirteen-lined ground squirrel. Construction will be curtailed during winter when big game species are present. Development will avoid any additional wetlands identified during future site-specific fieldwork. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf	The following SEZ-specific programmatic design features for minimization will be required: Disruptions during lambing/calving/fawning season for big game (such as bighorn sheep/elk/pronghorn) will be minimized. Appropriate engineering controls will be used to minimize impacts on palustrine wetlands surrounding the SEZ resulting from surface water runoff, erosion, sedimentation, accidental spills, or fugitive dust deposition to these habitats. Where big game winter ranges intersect or are close to the SEZ, use of motorized vehicles and other human disturbances will be controlled (e.g., through road closures or seasonal restrictions). Fencing around the solar energy development should not block the migratory corridors of mammals, particularly big game species. *See endnote* [i]	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact to functional habitat for full build-out of SEZ. Little can be done onsite to mitigate the loss of up to 2,650 acres of general wildlife habitat.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Migratory Birds Section 10.4.11.2	Direct: Loss of habitat and connectivity for several species. Noise, lighting, and vegetation clearing could impact migratory birds overflying, migrating, or using the SEZ or nearby wetlands. There is potential for migratory birds to be attracted to solar arrays (because solar panels may appear to be water or wetlands and may attract insects), resulting in collisions with solar arrays that cause injuries or fatalities. Migratory birds may be behaviorally susceptible to flight collision with solar arrays in the San Luis Valley wetlands landscape. Avian injury or fatality from collision with solar arrays is a particular risk at Los Mogotes East SEZ due to the location of the SEZ in migratory bird paths. For power tower facilities, burning of wings in the solar radiation field between heliostats and power towers has been observed. Indirect: Outside the SEZ, impacts could occur from habitat loss or modification related to groundwater depletions, or habitat loss or modification through the introduction of invasive species. Establishment of noxious weeds in the SEZ may result in spread of weeds to adjacent areas. Increased noise levels in the vicinity of the SEZ could result in disruption of breeding, migration, wintering, foraging, and other behavioral activities. Cumulative: Impacts to migratory birds could occur, depending on the number and location of other developments in the region. Data Gaps: Additional research needed on solar development impacts on migratory birds (and how far such impacts would extend away from the SEZ); Impacts on migratory birds from construction and operational noise would have to be considered on a project-specific basis.	SEZ-specific programmatic design features require that if present, prairie dog colonies (which could provide habitat or food resources for some bird species) will be avoided to the extent practicable; doing so would reduce impacts on associated bird species such as raptors. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf NEPA Los Mogotes East SEZ Specific Design Features: SRMS ER2-6: Consider the applicability of guidelines developed by the Avian Power Line Interaction Council.	See programmatic design features at URL under Avoidance column. SRMS Recommended Project-Level NEPA Los Mogotes East SEZ Specific Design Features: SRMS ER2-8: Evaluate construction timing restrictions in project-level NEPA alternatives to further reduce impacts. Timing limitation should be enforced from May 15-July 15 for any surface disturbing activities to protect migratory bird nesting and brood rearing, SRMS ER2-9: Conduct Raptor nest surveys within a 0.5-mile radius of the project site, If any raptor nests are located, appropriate timing limitations should be applied. SRMS ER2-10: Conduct Migratory bird monitoring in the Los Mogotes East SEZ	Yes. Some level of bird injury/fatality has been observed for all types of solar facilities (through collisions with equipment or from burns). Research is ongoing to quantify impacts and identify effective mitigation measures.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Plant Special Status Species Section 10.4.12	Direct: Ground disturbance, land clearing and grading, fugitive dust generated by project activities, and the spread of invasive species would result in loss of special status plant species habitat, if present, and might result in loss of individual plants. See also impact summary above under Vegetation and Riparian Areas. No Endangered Species Act (ESA)-listed or BLM Colorado-listed plant species have been identified that have suitable habitat within the SEZ. Indirect: Indirect impacts to individuals and habitat outside of the SEZ could occur from groundwater depletions, surface runoff, dust, or accidental spills. BLM local biologists indicate that suitable habitat for 2 BLM-sensitive plant species, including the rock-loving aletes and Ripley's milkvetch occur within 5 mi (8 km) of the SEZ boundary. Cumulative: There could be cumulative impacts on some special status plant species due to habitat destruction and overall development and fragmentation of the area. Data Gaps: Although habitat for listed species has not been identified within the SEZ, pre-disturbance surveys are required to identify the presence and abundance of special status species.	The following programmatic design features for avoidance will be required: Based on data from pre-disturbance surveys, disturbance to occupied habitats will be avoided to the extent practicable, per BLM Manual 6840. Disturbance to wetland and riparian habitats within the SEZ will be avoided or minimized to the extent practicable. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf See also avoidance measures listed for Vegetation and Riparian Areas, which would apply for Plant Special Status Species as well.	The following programmatic design features for minimization will be required: If avoidance is not possible for some species, translocation of individuals from areas of direct effects or compensatory mitigation (for example, through seed collection or reseeding at an appropriate offsite location) may be employed. Groundwater withdrawals will be avoided or limited to reduce impacts on groundwater-dependent special status species, including those species that may occur in riparian or aquatic habitats supported by groundwater. See other programmatic design features at URL under Avoidance column. See also minimization measures listed for Vegetation and Riparian Areas, which would apply for Plant Special Status Species as well.	Yes Populations of Ripley's milkvetch, BLM Sensitive Plant Species, *Astragalus ripleyi* have documented occurrence on lands and soils adjacent to the Los Mogotes SEZ. Developing 80% of both Los Mogotes and Antonito Southeast SE SEZs would be expect to result in a total loss to habitat or plants occurring there. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ. Development in the SEZ would result in alteration of up to 2,650 acres of habitat If present, little can be done onsite to mitigate the loss of special status plant species that may be present within the SEZ. Avoidance of individual plants may not be practical.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Ecology: Animal Special Status Species Section 10.4.12	Direct: Ground disturbance, land clearing and grading, and fugitive dust generated by project activities would result in loss of special status animal species habitat, if present, and might result in loss of individual animals. See also impact summaries above under Terrestrial Wildlife and Migratory Birds. Development on the SEZ could directly disturb individuals or habitat for seven BLM Colorado sensitive special status animal species, including the Mountain plover, big free-tailed bat, and Gunnison's prairie dog. Indirect: Indirect impacts to individuals and animal habitat outside of the SEZ could occur due to groundwater depletions, surface runoff, dust, noise, lighting, or accidental spills. Potential for adverse impacts from new roads and increased traffic. Suitable habitat for one additional ESA Candidate Species (Western yellow-billed cuckoo), one additional ESA Threatened species (Mexican Spotted owl), one additional ESA-listed endangered species (Southwestern willow flycatcher), one additional species proposed for listing under the ESA as endangered (New Mexico jumping mouse), and eight additional BLM-sensitive animal species (including the Rio Grande chub, Rio Grande cutthroat trout, ferruginous hawk, and several migratory waterfowl and shorebirds) occurs within 5 mi (8 km) of the SEZ boundary. Cumulative: There could be cumulative impacts on some special status animal species due to habitat destruction and overall development and fragmentation of the area. Data Gaps: Pre-disturbance surveys are required to identify the presence and abundance of special status species.	The following programmatic design features for avoidance will be required: Based on data from pre-disturbance surveys, disturbance to occupied habitats will be avoided to the extent practicable (per BLM Manual 6840). Avoidance or minimization of disturbance to wetland and riparian habitats within the SEZ will be employed to reduce impacts on the New Mexico jumping mouse, Rio Grande chub, Rio Grande cutthroat trout, Rio Grande sucker, milk snake, bald eagle, Barrow's goldeneye ferruginous hawk, southwestern willow flycatcher, and western yellow-billed cuckoo. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf See also avoidance measures listed for Terrestrial Wildlife and Migratory Birds, which would apply for Animal Special Status Species as well.	The following programmatic design features for minimization will be required: If avoidance is not possible for some species, augmentation, reintroduction, or translocation of individuals from areas of direct effects or compensatory mitigation may be employed. Groundwater withdrawals will be avoided or limited to reduce impacts on groundwater-dependent special status species, including those species that may occur in riparian or aquatic habitats supported by groundwater, including the southwestern willow flycatcher and the western yellow-billed cuckoo. *See endnote* [ii]	Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact to functional habitat for full build-out of SEZ.

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
		Avoidance	Minimization	
Environmental Justice Section 10.4.20	Direct: Based on guidelines from the Council on Environmental Quality, there are low income or minority populations within a 50-mile (80-km) radius and downwind of the SEZ, notably in the communities of Romeo, La Jara, and Manassa, as well as other outlying communities. Communities and neighborhoods adjacent to the Los Mogotes East SEZ have higher minority populations relative to the Colorado average (60% vs 30% minority) and have higher proportion of low-income population relative to the state average (58% vs 30% low income; EPA EJ Screen Reports, 2015) Disturbance of soils (particularly subsurface calcic soils) may produce fugitive dust and result in exposure to respirable particulates and/or microbes (human health impacts). SEZ dust would burden low income and minority populations in Conejos County at proportionately higher levels relative to other Colorado populations. Additional adverse impacts that might disproportionately affect minority and low-income populations include noise; reduced water quality and availability for agricultural and ranching water users; the visual impacts of solar energy facilities; negative effects on heritage livestock grazing; restricted access to land used for economic, recreation, sustenance hunting, or cultural/religious purposes; and effects on property values. Also, surface runoff, related erosion, and weed introduction could burden low income and minority populations and non-federal costs of service (i.e., weed control) in Conejos County at a higher proportion relative to other Colorado populations. The *benefits* of BLM solar energy development to low income and minority population in Conejos County may include some local employment opportunity and expanding integration with the regional renewable energy sector. Indirect: Projects could impose indirect costs to county services (roads, schools, clinic, etc.). Cumulative: The economic and benefit of Los Mogotes East SEZ development would accrue to a larger national public, including Conejos County. However, certain economic and environmental burdens would be greater on Conejos County than to a comparative county along the Front Range of Colorado. Cumulative contributions to the economy and environment from solar development could be moderated by offset compensation investments. Data Gaps: County government tax revenue from improvements on federal land (Source: Colorado Division of Property Taxation).	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Environmental_Justice.pdf SRMS Recommended Project-Level NEPA Los Mogotes East SEZ Specific Design Features: SRMS AQC2-2: Avoid construction during times of high dust emissions from other sources (e.g., agricultural plots) should also be considered. SRMS AQC2-3: The SEZ solar project Vegetation Management Plan should quantify site baseline soil protective cover and set project construction and operation-phase ground-level wind surface friction control targets beneath and surrounding solar arrays to reduce dust generation	Programmatic design features for air quality include a requirement to implement dust suppression measures during construction and operations. See other programmatic design features at URL under Avoidance column. SRMS Project-level NEPA Recommendations SRMS-AQ3 Evaluate solar panel mounting and other disturbance minimizing technologies in project-level NEPA alternatives (e.g. no grading of the site, retention of maximum native vegetation, use of low emission vehicles, placing gravel on roads, use of "drive and crush" installation).	Yes. SEZ development as a public land use in Conejos County, including associated federal revenues generated and residual environmental impacts, will be cumulative to historic forces that have contributed to a rural people's economic status. The 21st-century BLM solar energy development benefit and burden impact to low income and minority people includes their relationship with the federal government and is influenced by multigenerational economic impacts of early 20th century federal land tenure transfers of the Conejos Land Grant, including the Los Mogotes East SEZ

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Hydrology: Surface Water and Water Quality Section 10.4.9	Direct: Land clearing, land leveling, vegetation removal, groundwater use, and spills and runoff associated with development of the SEZ have the potential to alter flow routing, change surface runoff, reduce infiltration/recharge, cause loss of ephemeral stream networks, reduce evapotranspiration rates, increase sediment transport (by water), change sediment transport (by wind), and degrade water quality. No permanent surface water bodies are located on Los Mogotes East SEZ. Several ephemeral washes drain across the site in a west to east direction. Disturbance to intermittent/ephemeral stream channels within the Los Mogotes East SEZ should not have a significant impact on the critical functions of groundwater recharge, sediment transport, flood conveyance, and ecological habitat, given the relatively small footprint of the SEZ with respect to the study area. Indirect: Indirect impacts from development and groundwater use on ephemeral and perennial surface water features could occur. Cumulative: Alterations to ephemeral stream networks can alter groundwater recharge and surface runoff processes potentially impacting the basin-scale water balance and water quality aspects of water features receiving surface runoff. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Water.pdf SRMS Project-level NEPA Analysis Recommendations SRMS WR1: Project-level NEPA alternatives should evaluate maintenance of existing flow patterns at the site boundary, by avoiding ephemeral drainages and/or providing detention and/or retention facilities. To avoid any impact to downstream properties, Detention can be provided on the SEZ to capture the volume of flow that is represented by the increase between existing and proposed conditions. Retention could be utilized to capture all the additional flow volume with little to no overland surface water release. SRMS Recommended Project-Level NEPA Los Mogotes East Specific Design Features: SRMS WR2-2: The Vegetation Management Plan should include the maintenance of the maximum acreage of native vegetation cover practicable during construction and operation, and minimization of land disturbance in ephemeral washes and dry lakebeds. To avoid any impact to downstream properties, project-level NEPA alternatives should evaluate maintenance of existing flow patterns at the site boundary, by avoiding ephemeral drainages and/or providing detention and/or retention facilities. Detention can be provided on the SEZ to capture the volume of flow that is represented by the increase between existing and proposed conditions. Retention would be utilized to capture all the additional flow volume with little to no overland surface water releases.	See programmatic design features at URL given under Avoidance column. See additional surface water impact avoidance and minimization measure recommendations in BLM Solar Energy Zone Hydrology – Los Mogotes East SEZ (TetraTech, August, 2013).	Yes. Development of the SEZ may alter ephemeral stream channels that can impact runoff and groundwater recharge. Reductions to the connectivity of these areas with surface waters and groundwater could limit water availability and thus alter the ability of the area to support vegetation growth and diversity, generating critical habitat areas and connecting wildlife corridors.

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Hydrology: Groundwater Quality And Groundwater Availability Section 10.4.10	Direct: Los Mogotes East SEZ is located in the Rio Grande Basin. Groundwater withdrawals for development may cause declines in groundwater elevations that can impact water availability for surface water features, vegetation, ecological habitats, regional groundwater flow paths, and other groundwater users in the basin. Spills associated with development of the SEZ have the potential to degrade groundwater quality. Indirect: Groundwater withdrawals for solar energy facilities have the potential to affect other groundwater users in the basin. Indirect effects of groundwater withdrawal on connected perennial surface water features may include reduced water quality and availability for agricultural and ranching water users. Cumulative: Groundwater depletion has continued in the San Luis Valley aquifer system since 1950 due to withdrawal for agricultural and other purposes. Groundwater use for solar energy development may result in additional use of groundwater. However, the strict management of water resources in the Rio Grande Basin acts to ensure that any impacts from a new water use would continue to be equivalent to or less than those from current uses and that no net increase in the total amount of water used would occur. Data Gaps: None identified.	Groundwater use analyses suggest that full build-out of wet-cooled technologies is not feasible. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Water.pdf SRMS Recommended Project-Level NEPA Los Mogotes East SEZ Specific Design Features: SRMS WR2-3: If project-specific impacts to groundwater are identified, purchase of existing water rights must be evaluated to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table. See additional groundwater impact avoidance measures including detention and retention facility location recommendations in BLM Solar Energy Zone Hydrology – Los Mogotes East SEZ (TetraTech, August 2013)	Programmatic design features require that, for mixed-technology development scenarios, any proposed projects would have to reduce water requirements to a level sufficient to secure water rights and comply with water management in the San Luis Valley. Augmentation/compensation is required by the State of Colorado. See other programmatic design features at URL under Avoidance column.	Yes The nature of the solar technology deployed will dictate water requirements. Onsite mitigation will reduce, but will not eliminate the need for water. Dependent on compensation requirements and on the water demands of the development and whether the subsurface hydrology is affected.

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Lands & Realty Section 10.4.2	Direct: Development of the SEZ could disturb 2,650 acres (10.7 km^2). Two roads cross the area and provide access to a well-blocked area of public land west of the SEZ. Access routes to lands west of the SEZ could be affected by solar energy development if legal access through the SEZ is not maintained (also a recreation issue). Indirect: Increased traffic and increased access to previously remote areas also could change the overall character of the landscape. Public land availability to solar developers under constrained regional transmission infrastructure and power purchase agreement markets could conceivably indirectly impact private land markets and county revenues. Cumulative: The contribution to cumulative impacts of utility-scale solar projects on public lands on and around the Los Mogotes SEZ could be significant, particularly if the SEZ is fully developed with solar projects. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Lands_and_Realty.pdf	See programmatic design features at URL under Avoidance column.	No. By regulation, any new activity must occur in deference to existing rights. Thus, potential impacts have been avoided.
Livestock Grazing Section 10.4.4.1	Direct: Portions of three seasonal grazing allotments (Capulin, Little Mogotes and Ciscom Flats) would be lost (3%, 6%, and 38%, respectively). It is estimated in the Solar PEIS that solar development in the SEZ would result in a total loss of 188 animal unit months of forage per year. There are also livestock management facilities, including fences and watering places in the SEZ. Permittees would be reimbursed for their portion of the value of these range improvements; however, this would not completely cover their economic loss. The loss of use of the Ciscom Flats grazing permit could result in an adverse economic impact on the permittee, and also, possibly an adverse social impact, since for many permittees, operating on public lands has been a longstanding tradition. The county would lose tax revenues (minor impact), and BLM would also lose some revenue. Indirect: None identified. Cumulative: Reductions to seasonal grazing resulting from SEZ development would be cumulative to economic impacts to ranching families from drought imposed forage conservation measures on public lands and broader trends to economic viability of ranching as a result of long-term variability in rangeland productivity from increasing temperature and dryness as climate change models predict for the region. Big horn sheep grazing in conjunction with solar development could adversely affect sheep allotments. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Rangeland_Resources.pdf	See programmatic design features at URL under Avoidance column.	Maybe. Reductions to allotments are likely. Also, there is potential for loss of permittee-funded range improvements. If development occurs within existing grazing allotments, little can be done onsite to mitigate the loss to the allotments and the loss of grazing. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA.

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Military & Civilian Aviation Section 10.4.6	Direct: There are no identified military or civilian aviation uses in close proximity to the SEZ; therefore, there are likely no impacts. Indirect: None identified. Cumulative: Cumulative impacts would be small. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Military_Civilian_Aviation.pdf	Coordination with the military will be required on a project-specific basis to ensure that solar facilities do not interfere with operations. See other programmatic design features at URL under Avoidance column.	No. In comments on the Solar PEIS, the military indicated that at that time it had no concerns about potential impacts on its activities associated with solar development.
Minerals Section 10.4.8 and Section 10.4.24 of the Final PEIS	Direct: The SEZ does not contain existing oil and gas leases, mining claims, or geothermal leases. The SEZ has been withdrawn from receiving new mining claims for a period of 20 years, precluding impacts from many types of mining activities. Indirect: None identified. Cumulative: None identified. Data Gaps: None identified.	Not applicable	Not applicable	No

Resource/ Issue	Los Mogotes East SEZ Impacts[1]	Onsite Mitigation[2] - To what degree are impacts likely to be mitigated onsite?		Residual or Unavoidable Adverse Impacts[3]? (Include justification)
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Native American Concerns Section 10.4.18	Direct: It is likely that some plants traditionally important to Native Americans will be destroyed and that habitat of traditionally important animals will be lost. Indirect: Indirect visual and auditory impacts are possible. For example, it is possible that there will be Native American concerns about potential visual effects and the effects of noise from solar energy development in the SEZ on Blanca Peak. There would be general habitat loss with vegetation clearing and water reduction that could affect plant and wildlife species and ecosystem health. No impacts from disturbance during project development would likely occur to known culturally significant areas (i.e., San Luis Lakes and the Great Sand Dunes). Cumulative: Impacts on significant cultural resources and cultural landscapes associated with Native American groups are possible. The viewsheds of Los Mogotes Peaks and San Antonio Mountain, both significant to the Ute and Jicarilla Apache Tribes, may be impacted. It is possible that the development of utility-scale solar energy projects in the SEZ, when added to other potential projects likely to occur in the area, could contribute cumulatively to visual impacts in the valley as viewed from Blanca Peak and to the loss of traditionally important plant species and animal habitat. Data Gaps: Government-to-government consultation will be required to determine issues of Native American concern.	The following SEZ-specific programmatic design features for avoidance will be required: Known human burial sites and rock art (panels of petroglyphs and/or pictographs) will be avoided. Where there is a reasonable probability of encountering undetected human remains and associated funerary objects by a solar project, the BLM will carry out discussions with Indian tribes before the project is authorized, in order to provide general guidance on the treatment of any cultural items that might be exposed. Visual intrusion on sacred sites will be avoided to the extent practicable. Springs and other water sources that are or may be sacred or culturally important will be avoided to the extent practicable. Culturally important plant and wildlife species will be avoided to be extent practicable. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Native_American_Concerns.pdf	See programmatic design features at URL under Avoidance column.	Yes. Residual impacts to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and coordination with tribes.

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Paleontology Section 10.4.16	Direct: Impacts on significant paleontological resources in the PFYC Class 1 areas are unlikely. In the PFYC Class 4/5 areas, impacts on significant paleontological resources have a greater potential to occur. Indirect: The potential for impacts from looting or vandalism is unknown, but unlikely as any such resources would be below the surface and not readily accessed. Cumulative: The SEZ has a low to undetermined potential for paleontological resources. Therefore, will not likely be a cumulative impact on paleontological resources. Data Gaps: A more detailed look at the geological deposits is necessary to determine whether a paleontological survey is warranted.	SEZ-specific programmatic design features require that PFYC Class 4/5 areas be avoided to the extent possible for development within the SEZ. Where avoidance of Class 4/5 deposits is not possible, a paleontological survey would be required. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Paleo.pdf	Programmatic design features require that the BLM be notified immediately upon discovery of fossils. Work will be halted at the fossil site and continued elsewhere until qualified personnel, such as a paleontologist, can visit the site, determine the significance of the find, and, if significant, make site specific recommendations for collection or other resource protection. See other programmatic design features at URL under Avoidance column.	No. Any paleontological resources that are discovered will be preserved.

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		Avoidance	Minimization	
Recreation Section 10.4.5	Direct: Solar development will preclude current recreational activities that may occur within the SEZ boundary. Vehicle routes currently open within the SEZ could be closed or rerouted. Access routes to lands west of the SEZ could be affected by solar energy development if legal access through the SEZ is not maintained (also a lands and realty issue). The SEZ will be readily visible to travelers on U.S. 285 and on the Los Caminos Antiguos Scenic Byway. Only a small impact to pronghorn antelope hunting is likely because only a small portion of available habitat occurs within the SEZ. Indirect: Indirect effects would occur primarily on lands near the solar facilities and would result from the change in the overall character of undeveloped BLM-administered lands to an industrialized, developed area, displacing people who are seeking more rural or primitive surroundings for recreation. Great Sand Dunes National Park and Preserve, the Old Spanish National Historic Trail, two scenic railroads, the Los Caminos Antiguos Scenic Byway, the Sangre de Cristo Mountains, three national wildlife refuges, and numerous designated wilderness areas are among the highlights of the recreational and tourism opportunities of the area. Because the route of the West Fork of the North Branch of the Old Spanish Trail segment under study is so near the SEZ, it is anticipated that the viewshed of the Trail would be adversely affected and the potential future recreational attraction of the Trail might be reduced. However, the integrity and historical significance of the portion of the Trail near to the SEZ remain undetermined. Cumulative: Multiple developments in the vicinity of the SEZ could cumulatively reduce recreational opportunities. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Public_Access_and_Recreation.pdf	SEZ-specific programmatic design features require that as projects are proposed for the SEZ, the potential impacts on tourism will be considered and reviewed with local community leaders. If vehicle routes currently open within the SEZ are closed or rerouted, alternative routes may be established. See other programmatic design features at URL under Avoidance column.	Maybe. Depends on mitigation measures implemented on the basis of project-level NEPA. Relatively little recreation currently occurs in the SEZ. If new vehicle routes are established, a NEPA analysis would be required for those routes.

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Socioeconomics Section 10.4.19	Direct: Impacts on the local economy as a result of expenditures of wages and salaries and the collection of state sales and income taxes (from the workforce as well as property tax revenue from the construction of these facilities). Construction-related jobs would be temporary and the number of jobs would depend on the technology, number of facilities constructed concurrently, and size of each facility. Operational jobs will be more permanent and the number of jobs also depends on the type of technology and size of each facility). The adverse impacts, including county and/or state government costs, could occur locally or regionally due to the need for services for new workers during project construction and operation (e.g., housing, police, fire-fighters). Indirect: Beneficial impacts on the local economy as project wages and salaries, procurement expenditures, and tax revenues circulate through the economy of each state, thereby creating additional employment, income, and tax revenues. Indirect construction and operations jobs would depend on the technology, number of facilities constructed concurrently, and size of each facility. Beneficial impacts would be minor. Restricted land use from solar energy development could result in the loss of livestock grazing (include loss of jobs), a decline in grazing fees payable to the BLM and the county and reduced opportunities for recreation and tourism (including economic impacts). . Public land availability to solar developers under constrained regional transmission infrastructure and power purchase agreement markets could conceivably indirectly impact private land markets and county revenues due to competition for transmission availability Water requirements for Los Mogotes SEZ solar development would represent a new industrial use in a Colorado water resource sub-district in the Conejos River basin that is currently constrained and under review in State of Colorado water court. New utility-scale uses could indirectly affect agricultural water users and markets. If hunting in or near the SEZ declines due to solar development, there could be a loss of revenue to the State due to fewer issued hunting licenses. Cumulative: Beneficial impacts overall would include creation of additional jobs and income. The negative impacts, including some short-term disruption of rural community quality of life, would likely be short-term and/or specific to individual projects on the SEZ. Data Gaps: Additional information on extent of disruption of rural community quality of life.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Socioeconomics.pdf	See programmatic design features at URL under Avoidance column. <u>SRMS Recommended Project-Level NEPA Los Mogotes East SEZ Specific Design Features: SRMS S1-2:</u> Onsite mitigation could include requiring developers to secure agreements for local government services as a condition of "Notice to Proceed".	Maybe. For grazing impacts, depending on mitigation measures implemented on the basis of project-level NEPA. No shared revenue to state and local government from federal land rental and MW usage fees under current federal law and regulations

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Soils/Erosion Section 10.4.7	Direct: Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling), especially during the construction phase of a solar project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. Soils within the SEZ are predominantly very stony and cobbly loams of the Travelers and Garita Series, which now make up about 95% of the soil coverage at the site. Soil loss through sediment transport may occur.-Soil contamination from spills could occur. Disturbance of soils (particularly subsurface calcic soils) may produce fugitive dust. Indirect: Disturbance of soil can lead to introduction of invasive species. Elevated PM levels could result from soil disturbance/ grading activities during construction. Cumulative: Cumulative impacts would occur from the disturbance of several large renewable energy projects, connecting linear facilities, and other projects in the vicinity of the SEZ, but would be limited through the application of design features. Data Gaps: None identified.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Soil_Geologic_Hazards.pdf In addition, a Vegetation Management Plan should be required that includes the maintenance of the maximum acreage of native vegetation cover practicable during construction and operation to avoid dust sources.	See programmatic design features at URL under Avoidance column.	Yes. Level of site grading would be primary driver of residual impact for full build-out of SEZ. Little can be done to mitigate the loss of up to 2,650 acres of soil. Avoidance (not developing some areas) will reduce the acreage and soil stabilization measures can reduce soil erosion post disturbance.

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Specially Designated Areas - General Section 10.4.3	Direct: Specially designated areas (SDAs) within 25 mi (40 km) of the SEZ that could be impacted by solar development include the following: Alamosa National Wildlife Refuge, South San Juan Wilderness Area (WA), Cruces Basin WA, San Luis Hills Area of Critical Environmental Concern (ACEC), Los Mogotes ACEC, Cumbres & Toltec Scenic Railroad (CTSR) ACEC, San Antonio Gorge ACEC, San Luis Hills Wilderness Study Area (WSA), San Antonio WSA, roadless areas in the Rio Grande and Carson National Forests, Los Caminos Antiguos Scenic Byway, Sangre de Cristo National Heritage Area (NHA), and the West Fork of the North Branch of the Old Spanish Trail segment under study. Moderate to strong visual contrasts could be experienced in the San Luis Hills WSA and ACEC, and along the Los Caminos Antiguos Scenic Byway and portions of the West Fork of the North Branch of the Old Spanish Trail segment under study. There may also be moderate visual contrasts for some viewpoints within the newly designated Rio Grande del Norte National Monument. Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare), reduced recreation use, fragmentation of biologically linked areas, and loss of public access. Indirect: Nearby specially-designated areas could be impacted by development inside the SEZ, and also by increased traffic. Cumulative: Development of solar facilities and other facilities may result in cumulative effects, particularly visual impacts, on SDAs. Data Gaps: For projects in the Los Mogotes East SEZ that are located within the viewshed of the West Fork of the North Branch of the Old Spanish Trail segment under study, further study is needed, which may include archival research, archaeological investigation, and viewshed analysis, to determine the area of possible adverse impact.	See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/SDAs_and_LWC.pdf	SEZ-specific programmatic design features require that early consultation be initiated with the entity responsible for developing the management plan for the Sangre de Cristo NHA, in order to understand how development of the SEZ could be consistent with NHA plans and goals. See other programmatic design features at URL under Avoidance column.	Yes. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA. For visual impacts, full development of the SEZ with solar facilities would cause moderate to strong visual contrasts that could not be hidden from view from the specially designated areas.

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Specially Designated Areas - Lands with Wilderness Characteristics Section 10.4.3	Direct: A recent lands with wilderness characteristics (LWC) Inventory Update for LWC Units Upper Punche Valley (001-2016) and Los Mogotes (002-2016) determined that 1,761 acres of public land within the Los Mogotes East SEZ contain wilderness characteristics). The wilderness character of this area could be impacted by development in the SEZ. Indirect: Nearby land meeting criteria for wilderness characteristics could be impacted by development inside the SEZ. Increased traffic and increased access to previously remote areas could negatively impact lands with wilderness characteristics. Cumulative: Development of solar facilities and other facilities may result in cumulative effects, particularly visual impacts, on lands with wilderness characteristics. Data Gaps: Additional work regarding BLM''s LWC inventory may be warranted.	Programmatic design features include a requirement to consider options to avoid, minimize, and/or mitigate impacts to lands with wilderness characteristics as part of the project-specific environmental impact analysis, in coordination with the BLM. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/SDAs_and_LWC.pdf	See programmatic design features at URL under Avoidance column.	Yes.
Transportation and Public Access Sections 10.4.2 and 10.4.21	Direct: Development will add traffic to existing roads serving the area. U.S. 285 provides a regional traffic corridor that could experience moderate impacts for single projects, an increase during construction of nearly twice the current annual average daily traffic value for this route. Local roads would also be impacted. Glint and glare from solar facilities may affect aircraft pilots, motorists on nearby roads, or crew/passengers on nearby railways. Indirect: Potential for adverse impacts to wildlife from new roads and increased traffic (see Ecology-Wildlife section). Cumulative: Cumulative impacts to traffic could occur with multiple developments in the region. Data Gaps: None identified.	Programmatic design features for visual resources include a requirement to minimize glint and glare. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Transportation.pdf	The following SEZ-specific programmatic design features for minimization will be required: Public access to roads will be maintained through transportation management plan. Local roads improvements will be made to accommodate additional traffic. Construction activities will be planned to minimize impacts (e.g., send trucks in tandem). See programmatic design features at URL under Avoidance column.	No. Through a combination of avoidance, design features, and the establishment of alternative access routes to these areas, the potential impacts to transportation can be adequately mitigated.

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Visual Section 10.4.14	Direct: The Visual Resource Inventory (VRI) value for the SEZ and immediate surroundings are VRI Class III, indicating moderate visual values. Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare). The Solar PEIS identified strong visual contrasts for some viewpoints along the Los Caminos Antiguos Scenic Byway and West Fork of the North Branch of the Old Spanish Trail segment under study, and for the communities of Manassa, Romeo, and Sanford. Moderate visual contrasts were identified for San Luis Hills WSA and ACEC, and the community of La Jara. There may also be moderate visual contrasts for some viewpoints within the newly designated Rio Grande del Norte National Monument. Indirect: None identified. Cumulative: If several projects become visible from one location or in succession as viewers move through the landscape (such as driving on local roads, these cumulative impacts may make the area less visually appealing. Data Gaps: Additional data from key observation points may be needed.	SEZ-specific programmatic design features state that the development of power tower facilities within the SEZ should be prohibited. Additionally, there is a requirement to minimize glint and glare. See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Visual.pdf	SEZ-specific programmatic design features state that special mitigation should be considered for impacts to the Los Caminos Antiguos Scenic Byway. See other programmatic design features at URL under Avoidance column.	Yes. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA. While onsite mitigation would reduce visual contrasts caused by solar facilities within the SEZ, it would not likely reduce impacts to less than moderate or strong levels for nearby viewers.
Wild Horses and Burros Section 10.4.4.2	There are no designated wild horse and burrow herds present in the area. There would be no effect on designated wild horse and burro herds from solar energy development of the SEZ. Data Gaps: None identified.	Not applicable	Not applicable	No

Endnotes:

[i] Ecology: Terrestrial Wildlife (continued):

Undisturbed buffer areas and sediment and erosion controls will be maintained around drainages associated with wetland areas located in the immediate vicinity of the SEZ.

See other programmatic design features at URL under Avoidance column.

[ii] Ecology: Animal Special Status Species (continued):

Consultations with the USFWS, CO Division of Wildlife and NM Division of Game and Fish will be conducted to address the potential for impacts on the Mexican spotted owl and southwestern willow flycatcher, and northern leopard frog.

See other programmatic design features at URL under Avoidance column.

See also minimization measures listed for Terrestrial Wildlife and Migratory Birds, which would apply for Animal Special Status Species as well.

APPENDIX B

Regional and SEZ-Specific Conceptual Models

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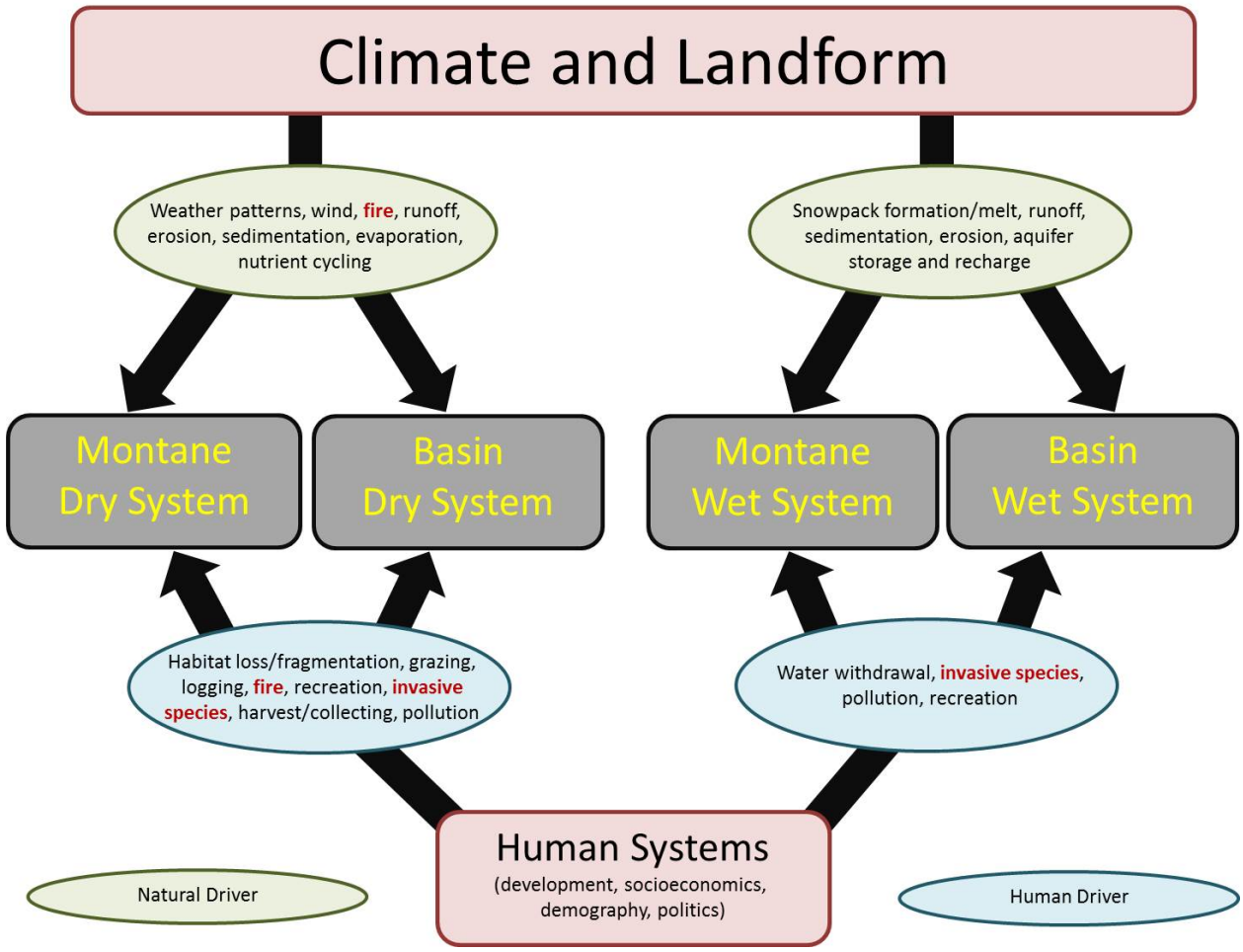
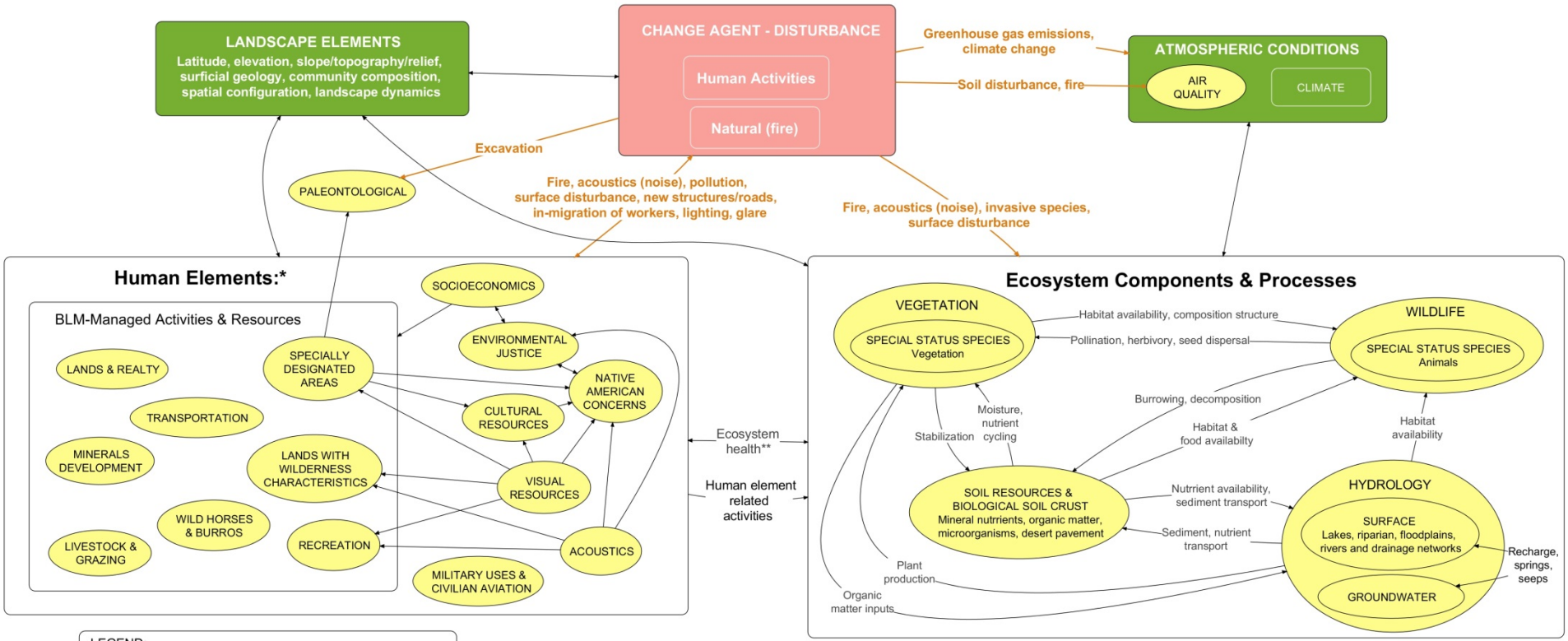
Tier 1 Conceptual Model
San Luis Valley/Taos Plateau Study Area

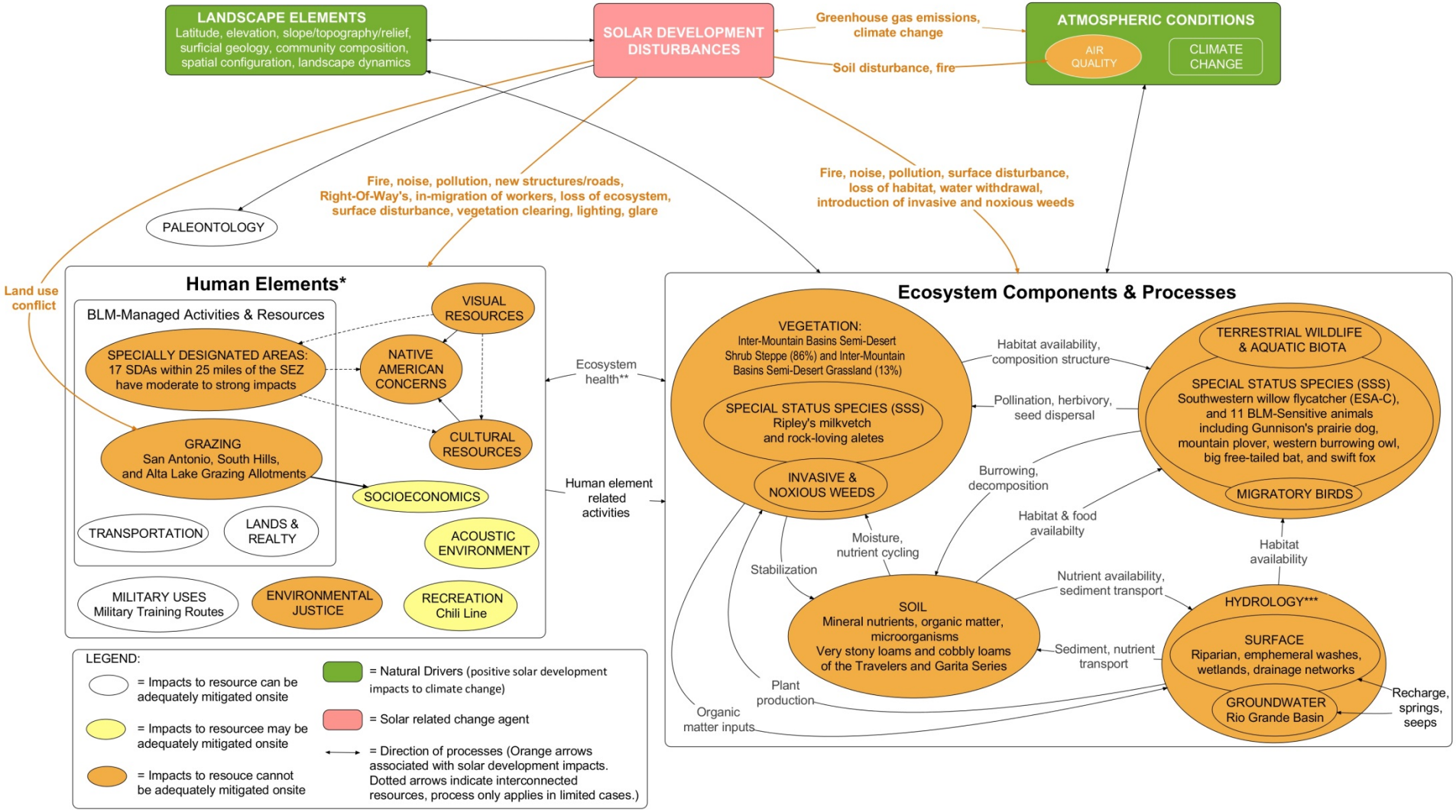


Tier 2 Conceptual Model
Resource-Based Model



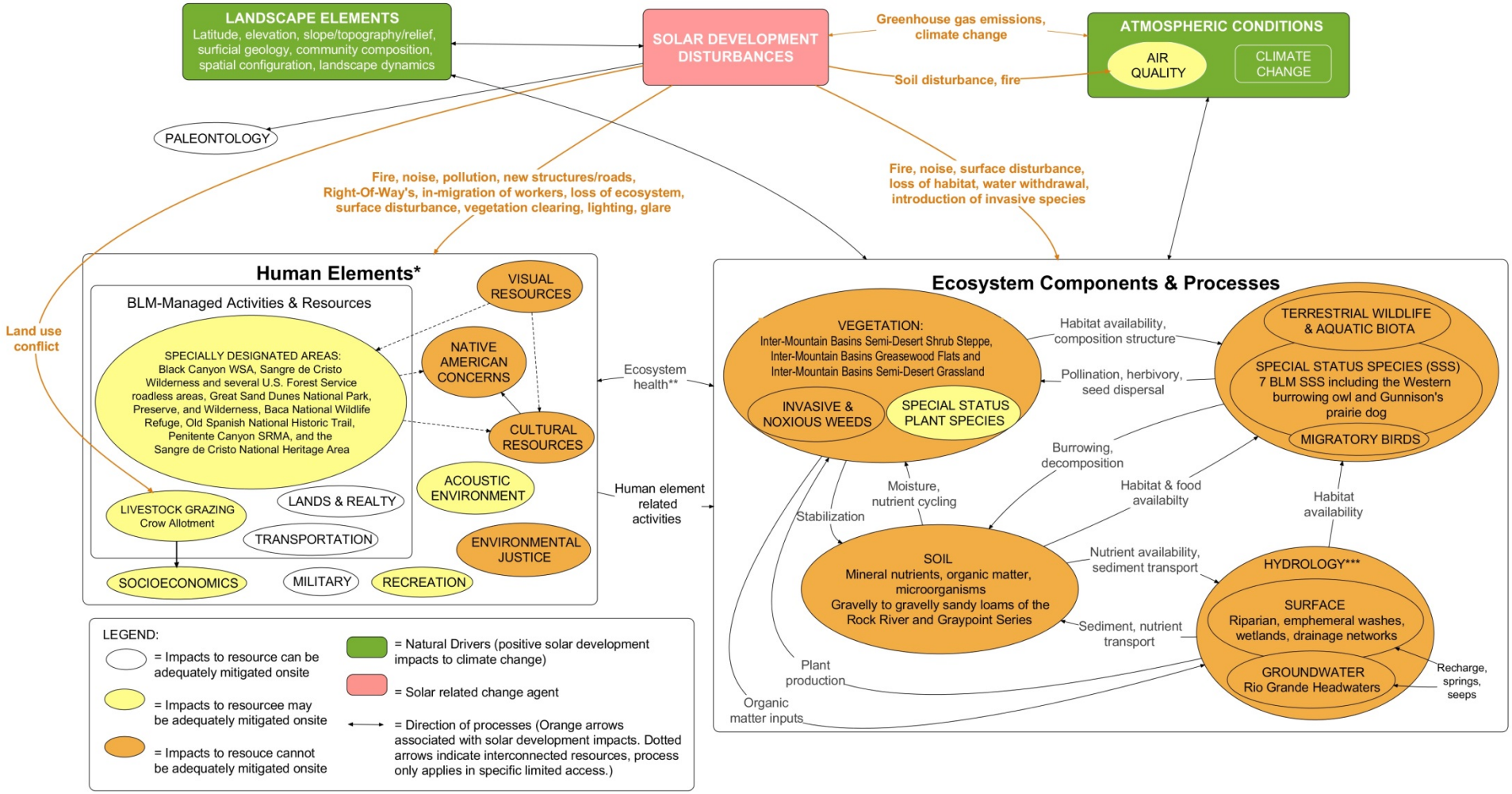
* Human Elements includes the human concerns and related resources for which impact evaluation was included in the Solar PEIS. These are activities and resources with (or requiring) human engagement in one of the following ways: 1) requires active participation in management of a resource or activity (e.g., lands and realty, specially designated areas, transportation, grazing, mineral development, recreation, military uses); 2) addresses the perspective or perception of a resource (e.g., visual resources, acoustics, lands with wilderness characteristics, cultural); and/or 3) addresses human- specific values (e.g., cultural resources, Native American concerns, socioeconomics, environmental justice).
**Ecosystem health is referred to as the degree to which the integrity of the soil and the ecological processes of the ecosystem are sustained (BLM Handbook H-4180-1). Ecosystem health can influence Native American concerns, visual resources, specially designated areas, and recreation. Human elements can also influence ecosystem components (e.g.,recreation can compact soils, hunting can impact species, etc.).

Tier 3 Conceptual Model
Antonito Southeast SEZ Solar Development Model



* Human Elements includes the human concerns and related resources for which impact evaluation was included in the Solar PEIS. These are activities and resources with (or requiring) human engagement in one of the following ways: 1) requires active participation in management of a resource or activity (e.g., lands and realty, specially designated areas, transportation, grazing, mineral development, recreation, military uses); 2) addresses the perspective or perception of a resource (e.g., visual resources, acoustics, lands with wilderness characteristics, cultural); and/or 3) addresses human- specific values (e.g., cultural resources, Native American concerns, socioeconomics, environmental justice).
**Ecosystem health is referred to as the degree to which the integrity of the soil and the ecological processes of the ecosystem are sustained (BLM Handbook H-4180-1). Ecosystem health can influence Native American concerns, visual resources, specially designated areas, and recreation. Human elements can also influence ecosystem components (e.g.,recreation can compact soils, hunting can impact species, etc.).
*** Hydrologic impacts may occur due to changes in drainage and recharge patterns; these impacts can be mitigated onsite. Potential impacts to water availability will be mitigated onsite through the implementation of a net neutral use policy (water rights must be purchased.

Tier 3 Conceptual Model
De Tilla Gulch SEZ Solar Development Model



* Human Elements includes the human concerns and related resources for which impact evaluation was included in the Solar PEIS. These are activities and resources with (or requiring) human engagement in one of the following ways: 1) requires active participation in management of a resource or activity (e.g., lands and realty, specially designated areas, transportation, grazing, mineral development, recreation, military uses); 2) addresses the perspective or perception of a resource (e.g., visual resources, acoustics, lands with wilderness characteristics, cultural); and/or 3) addresses human- specific values (e.g., cultural resources, Native American concerns, socioeconomics, environmental justice).
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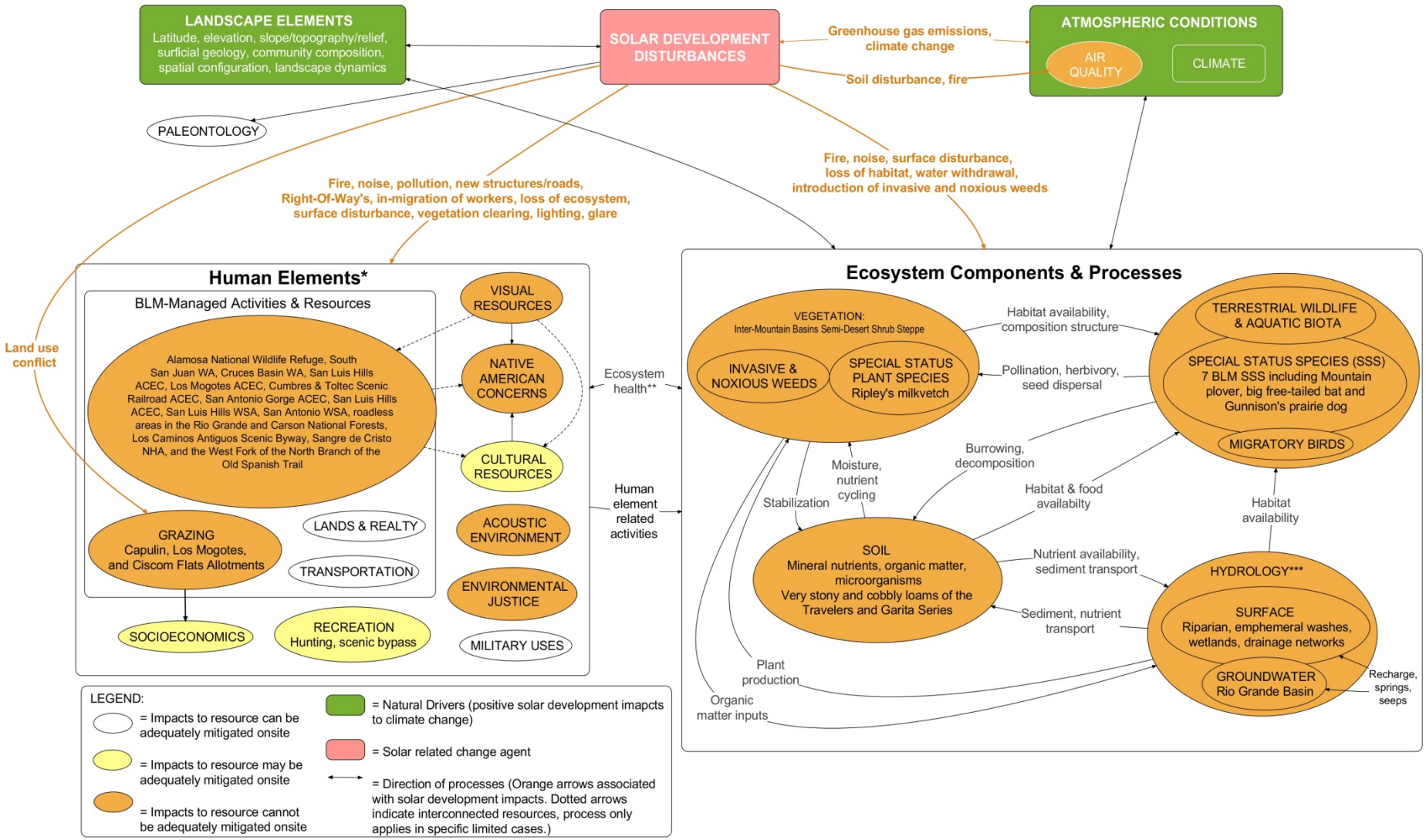
*** Hydrologc impacts may occur due to changes in drainage and recharge patterns; these impacts can be mitigated onsite. Potential impacts to water availability will be mitigated onsite through the implementation of a net neutral use policy (water rights must be purchased).

Tier 3 Conceptual Model
Los Mogotes SEZ Solar Development Model



* Human Elements includes the human concerns and related resources for which impact evaluation was included in the Solar PEIS. These are activities and resources with (or requiring) human engagement in one of the following ways: 1) requires active participation in management of a resource or activity (e.g., lands and realty, specially designated areas, transportation, grazing, mineral development, recreation, military uses); 2) addresses the perspective or perception of a resource (e.g., visual resources, acoustics, lands with wilderness characteristics, cultural); and/or 3) addresses human- specific values (e.g., cultural resources, Native American concerns, socioeconomics, environmental justice).
**Ecosystem health is referred to as the degree to which the integrity of the soil and the ecological processes of the ecosystem are sustained (BLM Handbook H-4180-1). Ecosystem health can influence Native American concerns, visual resources, specially designated areas, and recreation. Human elements can also influence ecosystem components (e.g.,recreation can compact soils, hunting can impact species, etc.).
*** Hydrologc impacts may occur due to changes in drainage and recharge patterns; these impacts can be mitigated onsite. Potential impacts to water availability will be mitigated onsite through the implementation of a net neutral use policy (water rights must be purchased).

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APPENDIX C

SUMMARY TABLES: EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION FOR THE COLORADO SOLAR ENERGY ZONES

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EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Acoustics	Probable Terrestrial wildlife, birds, bats	Probable Noise level depends on technology, construction and operational phase traffic	Moderately Context: Low current ambient noise on site. Intensity & Duration: Construction-phase noise limited, operation-phase traffic noise levels 30+ years or permanent change	Moderately Residual operational-phase noise impacts resulting from 80% build out of 9,700 acre SEZ, represent a large undeveloped geographic area where new noise would occur would be of long duration: (minimum of 30 years) and cumulative to noise sources from the nearby Imery plant, railroad, Highway 285 and Town of Antonito. *See also endnote* [i]	Noise associated with solar development on the SEZ represents a Human Element that also impacts wildlife.	SEZ noise impacts would be cumulative to vegetation-habitat impacts from 80% build out of the 2,650 acres at Los Mogotes East SEZ and other ongoing activities in the vicinity of the Antonito Southeast SE SEZ.	Possibly When considered cumulative to impacts associated with loss of 9,700 acres of vegetation-habitat for terrestrial wildlife, sensitive species, raptors, and migratory birds.

[1] BLM CO-NM Technical-IDT Qualitative Assessment Rating: Yes, Probable, Possible, Unlikely, No

[2] BLM CO-NM Technical-IDT Qualitative Assessment Rating: Certain, Probable, Possible, Unlikely, No

[3] BLM CO-NM Technical-IDT Qualitative Assessment Rating: Highly, Potentially Highly, Moderately Highly, Moderately, Low

[4] BLM CO-NM Technical-IDT Qualitative Assessment Rating: Highly, Potentially Highly, Moderately Highly, Moderately Low. Status and trend of the resource evaluated on the basis of landscape assessment data (Walston et al. 2016) for current distribution and predicted effects of change agents, other baseline data sources (see http://www.blm.gov/co/st/en/fo/slvfo/solar/solar_regional_mitigation.html), and IDT specialist subject matter expertise.

[5] Walston et al. 2014, Appendix D. Conservation Element-Specific Conceptual Models.

[6] BLM Technical-IDT Qualitative Assessment Rating: Yes, Possibly, No

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Air Quality	Yes Depending on level and timing of SEZ build out, particularly level of native plant cover retention within SEZ	Certain Under the Solar PEIS ROD (BLM 2012) grading assumptions and 80% build out scenario for a 9,700 acre SEZ that does not specify native plant cover retention. Level of residual impact on-site depends on extent of site grading, level of new road construction, traffic, degree of retention of native plant cover, and/or use of dust suppressants.	Moderately Highly Considered PM10 avoidance and minimization measures core to residual impact onsite significance. The duration of construction-phase fugitive dust would be limited for any individual SEZ project with trafficked access routes likely mitigated by use of dust suppressants. The extent of 80% buildout scenario, (r~ equivalent acreage to 48 fallowed center-pivot irrigation fields) is large. Calcic soil types and silty textured soils at surface and subsurface potentially exposed to wind erosion at Antonito Southeast SEZ is a driving USDA-NRCS and BLM residual impact concern.	Highly Aggregate residual air quality impacts from dust (PM10 – PM2.5) in a region and air basin (San Luis Valley) that annually experiences seasonal dust storms and measured events exceeding 400 ppm PM10, along with associated public health effects to sensitive populations <u>Landscape:</u> Residual impacts could result from 80% build-out of the 9,700 acre SEZ, specifically new fugitive dust, to undeveloped areas in this air basin; specifically, communities & households in Conejos County, CO adjacent or downwind to SEZ and residual visibility effects to Rio Grande National Monument in Taos County, NM. *See also endnote [ii]*	Air emissions associated with solar development on the SEZ represent a Human Element that also impacts wildlife.	Problematic dust sources adjacent to 9,700 acre SEZ. Possible concurrent 80% build out of 2,650 acres on Los Mogotes East SEZ in Conejos County. Potential residual impacts resulting from use of dust suppressant at SEZ-scales on multiple projects over the 20-yr assessment period are unknown, and potentially extensive depending on area of 9,700 acre SEZ where suppressants would be applied.	Possibly Avoidance-minimization measures to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.) and varied levels of native plant cover retention and/or use of dust suppressants are reasonable alternatives for project-level NEPA analysis.) Dust monitoring or dust studies should be used to identify, validate, or invalidate dust avoidance measures and inform adaptive management in Antonito Southeast SEZ development Findings to be informed by dust impact modeling (Cheng et al. 2016).
Climate Change	No						No

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Cultural	Yes Landscape-Level Cultural Heritage Values and Risk Assessment (Wescott et al. 2016) to inform assessment	Possible	Depends on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and pre-development cultural inventory and evaluation.		Human Element		Possibly Impacts warranting mitigation to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and coordination with stakeholders

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Ecology: Vegetation and Riparian Areas	Yes	Certain Many impacts to riparian areas can be mitigated onsite by avoiding development in riparian areas and by the installation of engineering controls on surface water runoff/erosion.	Highly The extent of an 80% Antonito Southeast SEZ build out scenario, (roughly equivalent acreage to 48 center-pivot irrigation fields at 160 acres each) includes loss of important winterfat-shortgrass vegetation and represents very significant onsite big-game habitat conversion and fragmentation. Project-level NEPA vegetation avoidance alternatives may result in retaining and/or restoring some vegetation.	Highly Winterfat-short grass basin shrub-grassland loss at Antonito Southeast scale (9700 acres) and 80% build out scenario represents a regionally extensive acreage and high degree of winter range habitat loss and fragmentation adjacent to the Rio Grande del Norte National Monument. Any soil disturbance also affects ground nesting pollinators and host plant reproduction. Ground nesting pollinators are the most dominate pollinators in these systems. <u>Landscape:</u> Potential residual impacts to vegetation from Antonito Southeast SEZ development would occur within a San Luis Valley-Taos Plateau region, where 45% of the basin grassland and shrubland, (~737,854 acres) is projected to be moderately to very highly degraded and be subject to invasive species invasion by 2030, yet further reducing vegetation productivity in a landscape already 20% degraded from that ecological system change agent, (Walston et al. 2016). *See also endnote [iii]*	Basic Component	Possible concurrent 80% build out of 2600 acres on Los Mogotes SEZ in Conejos County and other ongoing activities in the vicinity of the Antonito Southeast SEZ. SEZ Vegetation Management Plan needs to include best management practice (BMPs) for pollinators.	Yes As a critical component of a functioning ecosystem. When possible, native soils and vegetation should be left undisturbed and solar arrays should be placed on these undisturbed areas. Avoidance-minimization measures to maintain the highest degree of retention of native plant cover, foster low stature vegetation growth, and to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.) are reasonable alternatives for project-level NEPA.

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Invasive & Noxious Weeds	Yes	Certain Vegetation management plan requirements, including weed management strategy, will reduce but not eliminate risk of spread of invasive and noxious weeds at 80% SEZ build-out scale.	Highly Design features can greatly reduce, but not eliminate the risk of establishment and spread of invasive species. The extent of an 80% Antonito Southeast SEZ build out scenario is roughly equivalent acreage to 48 center-pivot irrigation fields at 160 acres and represents a very large change in invasive species spread risk.	Highly Disturbance and/or loss of winterfat-short grass shrub-grassland at Antonito Southeast scale (9,700 acres) and 80% build out scenarios represent a regionally extensive acreage and high degree of native ground cover loss and increased invasive risk adjacent to the Rio Grande del Norte National Monument. Any soil disturbance also affects ground nesting pollinator and host plant reproduction, impacts those populations and affects plant reproduction. Ground nesting pollinators are the most dominate pollinators in these systems. <u>Landscape:</u> Potential residual impacts to vegetation from Antonito Southeast SEZ development would occur within a San Luis Valley-Taos Plateau region, where 45% of the basin grassland and shrubland (~737,854 acres) is projected to be moderately high to very highly degraded and be subject to invasive species invasion by 2030, yet further reducing vegetation productivity in a landscape already 20% degraded from that ecological system change agent (Walston et al. 2016). *See also endnote* [iv]	Change Agent	Possible concurrent 80% build out of 2,600 acres on Los Mogotes SEZ in Conejos County and other ongoing activities in the vicinity of the Antonito Southeast SEZ.	Possibly As a critical component of a functioning ecosystem and high-cost land management action. When possible, the native soils and vegetation should be left undisturbed and solar arrays should be placed on these undisturbed areas. Avoidance-minimization measures to maintain the highest degree of retention of native plant cover, foster low stature vegetation growth, and to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.) are reasonable alternatives for project-level NEPA. .

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Ecology: Terrestrial Wildlife	Yes	Certain	Highly Expect the loss of habitat for most general wildlife species over the entire developable area.	Highly High ecological significance from residual impacts due to overall extent of habitat loss (80% of 9700 acres) for grassland fauna and reduction of connectivity to the San Antonio River corridor and to isolated water sources interspersed throughout SEZ. <u>Landscape:</u> High significance likely from residual cumulative impacts from Antonito Southeast SEZ development because SEZ is largely undeveloped, whereas 29% of grassland fauna habitat in the surrounding landscape has been either highly or very highly modified by human development; human modification of grassland fauna habitat is expected to increase to 37% by 2030. Likewise, pronghorn, elk/deer habitat, and migration habitat are defined as 3 conservation elements under this analysis and are currently intact in the SEZ but are highly or very highly modified at levels of 30%, 19%, and 8%, respectively, across the larger landscape and are expected to increase to 35%, 26%, and 14%, respectively, by 2030. *See also endnote [v]*	Basic Component	There is movement of animals between this SEZ and the Rio Grande del Norte National Monument and Taos Plateau. Wildlife habitat was identified as one of the objects for which the monument was designated (White House 2013). Consideration of wildlife movements between the SEZ and the Monument are important.	Yes As a critical component of a functioning ecosystem.

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Ecology: Migratory Birds, Raptors, Eagle	Yes	Certain Based on inference to FWS-BLM monitoring (2012-2014) at Palen and Desert Sunlight solar facilities in California. Migratory bird, eagles, raptor monitoring data needed.	Potentially Highly Significance level will be re-evaluated when more monitoring data is available.	Potentially Highly The Rio Grande Gorge and the larger landscape of the Rio Grande del Norte National Monument is a significant part of a migratory bird flyway and partially designated for that object (migratory birds) in Presidential Proclamation (White House 2013). This SEZ is close to the Monument and would be closely tied in habitat use along this flyway. There is potential for impact to golden eagle, ferruginous hawk, sandhill cranes, and other migrating birds due to risk of collisions with the solar arrays in addition to the overall loss from 80% development of 9,700 acres of shrub/grassland habitat along this flyway. Cumulative impacts from the factors listed above in addition to increased noise in the SEZ, increased lighting, and increased insects in the development area attracting birds are additive to human development in the landscape. Projections show an increase in human development from the current level of 29% across the larger landscape to 37%, which could result in a higher significance of residual impacts for migrating birds through development of this SEZ. *See also endnote [vi]*	Basic Component	Close proximity to the Rio Grande del Norte National Monument and Taos Plateau. Systematic survey, monitoring, and baseline research under regional ecological conditions required to understand residual or unavoidable impact, deterrence measures and effectiveness for migratory birds, raptors, and eagles.	Yes As a key grassland component in the flyway for migrating birds.

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Ecology: Plant Special Status Species (SSS)	Yes	Certain Loss of habitat is certain. Loss of individual SSS plants is likely (e.g., Ripley's milkvetch, rock-loving aletes)	Moderately Onsite survey required. Expect the total loss of SSS habitat or individual plants and/or habitat in the developable area.	Moderately Highly Moderately high significant residual impacts for sensitive plants are expected due to the anticipated 80% development of 9,700 acres as well as cumulative effects from the potential of also developing Los Mogotes SEZ. Minimization measures implemented that reduce soil disturbance and vegetation loss are likely to help, but not eliminate the impacts. Loss of special status species habitat or occurrence of sensitive plants is a regional concern when considered at the San Luis Valley – Taos Plateau ecological scale and relevant to long-term conservation of Ripley's milkvetch.	Basic Component (along with other vegetation)	Mitigation of impacts to SSS is required by BLM policy.	Yes

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Ecology: Avian or Terrestrial Special Status Species (SSS)	Yes	Certain Loss of habitat is certain. Loss of SSS animals is possible.	Highly Very high due to the SEZ size– expect the total loss of habitat for SSS animal species over the entire developable area.	Highly Aggregate habitat loss and fragmentation impacts resulting from 80% build out of 9,700 acres to eight BLM Terrestrial Special Status Species is a regional concern when considered at the San Luis Valley – Taos Plateau ecological scale and relevant to long-term conservation of Gunnison's prairie dog, burrowing owl, swift fox, ferruginous hawk, Brewer's sparrow, mountain plover, and Northern leopard frog. <u>Landscape</u> Moderately high significance of residual impacts is still anticipated for Gunnison's prairie dog, burrowing owl, and swift fox. Avoidance measures protecting occupied habitat will reduce residual impacts; however, impacts would still be present because of overall habitat loss (80% of 9,700 acres), loss of connectivity of habitat, and cumulative effects. *See also endnote [vii]*	Basic Component (along with other wildlife)	Mitigation of impacts to SSS is required by BLM policy.	Yes

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Environmental Justice	Yes.	Possible Depends on the level of fugitive dust generated; noise levels; and water, grazing, visual, socio-economic, recreational, cultural, and hunting impacts. Additionally, depends on whether impacts to sensitive populations are disproportionate.	Potentially Highly The extent of the 80% build out scenario (roughly equivalent acreage to 48 fallowed center-pivot irrigation fields) is large. Calcic soil texture at surface and subsurface potentially exposed to wind erosion at Antonito Southeast SEZ is a driving human health concern. The duration of construction-phase fugitive dust would be limited for any individual SEZ project with traffic access routes likely mitigated by use of dust suppressants. A limited number of nearby residents are most likely to experience noise impacts.	Potentially Highly Residual air quality impacts in a region and air basin that annually experiences seasonal dust storms, measured events exceeding 400 ppm PM10, and associated public health effects to sensitive populations. Conejos County households do not currently experience regional dust events to the extent of households in Alamosa, Costilla, Rio Grande, & Saguache Counties. <u>Landscape</u> Landscape level impacts disproportionately impacting sensitive populations are particularly likely to be associated with dust, cultural, and visual impacts. Residual impacts could result from 80% build-out of the 9,700 acre SEZ, specifically fugitive dust, to new areas in the air basin, specifically communities and households in Conejos County downwind of the SEZ, and residual visibility effects to Rio Grande del Norte National Monument in Taos County, NM. *See also endnote [viii]*	Human Element	Problematic dust sources adjacent to 9,700 acre SEZ. Concurrent 80% build out of 2,650 acres on Los Mogotes SEZ in Conejos County. The potential residual impacts resulting from use of dust suppressant at SEZ-scales on multiple projects over the 20-yr assessment period are unknown for the 9,700-acre SEZ.	Yes The economic benefits of SEZ development to low income and minority populations in Conejos County relative to the direct economic and environmental burden accruing may warrant some level of community directed investments to offset those impacts. Avoidance-minimization measures to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.), or based on maintaining the highest degree of retention of native plant cover, are reasonable alternatives for project-level NEPA analysis.

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Hydrology: Surface Water and Water Quality	Yes Development of the SEZ may alter ephemeral stream channels that can impact runoff and groundwater recharge. Reductions to the connectivity of these areas with surface waters and groundwater could limit water availability and thus alter the ability of the area to support vegetation growth and diversity, generating critical habitat areas and connecting wildlife corridors.	Certain Based on SEZ grading assumptions and 80% build out scenario that does not specify native plant cover retention, there would be residual impacts on flow timing and routing, loss of ephemeral stream networks and alterations of natural drainage patterns. *See also endnote [ix]*	Highly The SEZ is located within three HUC-12 watersheds. About 4,645 acres of land would be disturbed within one of the watersheds that has an area of 26,011 acres. The disturbance rate will be about 18% of this watershed. The other two watersheds would have 8% and 0.06% disturbance rates. Based on the disturbance rating, onsite residual impacts on these three watersheds would be very high, moderate, and low, respectively.	Moderately Although the total disturbance area of the SEZ with respect to the region is minimal, currently 26% of the region has experienced high human development, and 19% of the region has been highly impacted by climate change. In addition, the region surface water is scarce, with mostly ephemeral and intermittent streams. Perennial streams originate in adjacent mountainous ecoregions. Very few lakes or reservoirs are present. Some perennial water bodies are changing to ephemeral. In general, all these impacts on an ecoregion with dry and arid climate, added cumulatively to the proposed SEZ development, would have moderate residual impacts in the region.	Basic Component	Some impacts can be mitigated onsite by avoiding development in the ephemeral drainages and by the installation of engineering controls on surface water runoff/ erosion. Dependent on the level/type of dust suppressant used during SEZ development, there would be impacts on surface water quality.	Yes Depending on the level of grading and retention of native plant species. Avoidance-minimization measures to maintain the highest degree of retention of native plant cover and to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.) are reasonable alternatives for project-level NEPA.

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Hydrology: Groundwater Quality & Availability	Yes. The nature of the solar technology deployed will dictate water requirements. Dependent on compensation requirements, on the water demands of the development, and whether the subsurface, hydrology is affected. Onsite mitigation will reduce, but will not eliminate the need for water.	Certain. Assuming 80% SEZ build-out and residual impacts. Depends on the level of water demand of the development and whether the subsurface hydrology is affected.	Potentially Highly Groundwater withdrawals for SEZ development may cause declines in groundwater elevations that can impact water availability for surface water features, vegetation, and ecological habitats.	Potentially Highly The Antonito Southeast SEZ is located in the Rio Grande Basin. The combined groundwater withdrawals for a solar energy facility and other withdrawals and uses in the basin could exceed the sustainable yield and dewater the aquifer to the degree that nearby water wells and other water bodies are adversely affected. Depending on solar technology deployed, groundwater withdrawals exceeding the sustainable yield of the groundwater basin could cause permanent loss of storage capacity in the aquifer. However, the strict management of water resources in the Rio Grande Basin acts to ensure that any impacts from a new water use would be minimal.	Basic Component	Groundwater depletion from the basin continues to increase. The total cumulative depletion of groundwater storage starting from 1900 to 2000 is about 3.3 km^3 and from 1900 through 2008 is about 3.6 km^3 (Konikow 2013). Dependent on the level/type of dust suppressant used during SEZ development, there would be impacts on groundwater quality.	Yes Depends on technology used and on compensation requirements.
Lands & Realty	No By regulation, any new activity must occur in deference to existing rights. Thus, potential impacts have been avoided.						No

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Livestock Grazing	Probable	Probable Assuming 80% SEZ build-out and residual impacts on 3 grazing allotments.	Potentially Highly	Moderately Winterfat-short grass basin shrub-grassland loss at Antonito Southeast SEZ scale (9,700 acres) and 80% build out scenario represents a regionally extensive acreage of public grazing land conversion.	Land Use	IM No. 2013-142 states that regional mitigation for loss of AUMs is not required. Rio Grande del Norte National Monument Planning.	No However, reimbursement for loss of range improvements will be addressed in project-specific NEPA.
Military & Civilian Aviation	No						No
Minerals	No					Lands have been withdrawn from location or entry under the mining laws.	No
Native American Concerns	Yes	Probable Traditionally-important plants will likely be destroyed and habitat for traditionally-important animals will likely be lost.	See vegetation and wildlife sections in this table.	Residual impacts to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses.	Human element		Unknown at this time. Consultation on project applications will determine whether regional mitigation may be warranted.
Paleontology	No						No

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Recreation	Possible .	Probable Depends on mitigation measures implemented on the basis of project-level NEPA.	Low Relatively little recreation currently occurs in the SEZ. If new vehicle routes are established, a NEPA analysis would be required for those routes.	Low			No
Socioeconomics	Possible Over the course of a 30-year BLM right-of-way permit, some private sector employment, potential future but uncertain federal-state revenue sharing; county cost-of-services; grazing & current recreational activity preclusion (e.g., hunting). Indirectly influences wider SLV water markets and private land markets for renewable energy.	Possible	Moderately Depends on mitigation measures implemented on the basis of project-level NEPA.	Potentially Highly Full Antonito Southeast SEZ build-out scenario (80% of 9,700 acres over a 20 year period), with up to 1,554 MW potential, would represent a regionally high direct and indirect social and economic influence on Conejos County, CO, the San Luis Valley, Colorado, northern New Mexico, as well as western and local renewable energy markets in terms of federal revenue, employment & services, housing, county cost-of-services, land use foregone (e.g.,. grazing, recreation), potential but uncertain impact to regional tourism, Sangre de Cristo and Northern Rio Grande National Heritage Area goals, regional cultural sense of place, quality of life, and other social and economic cost-benefit and/or trade-offs.	Human element		Possibly

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Soils/Erosion	Yes Programmatic design features can reduce but not eliminate soil erosion risk assuming disturbance of up to 7,770 acres. Level of site grading would be a primary driver of residual impact for full build-out of SEZ. In addition, avoidance (not developing some areas) will minimize the acreage and soil stabilization measures can reduce post disturbance soil erosion.	Certain Based on SEZ grading assumptions and 80% build-out scenario that does not specify native plant cover retention, there would be residual impacts on soils.	Highly Soil disturbance that occurs as a result of construction activities like grading, excavation and backfilling that displace topsoil and disturb the existing soil profile. Such soil disturbances affect vegetation by disrupting indigenous plant communities and facilitating the growth of invasive species. In addition, soil loss due to erosion and deposition by wind and water and surface runoff would occur, resulting in sedimentation.	Highly Although the total disturbance area of SEZ with respect to the region is very minimal, currently 26% of the region has experienced high human development, and 19% of the region has been highly impacted due to climate change, topsoil loss by wind and water erosion would have residual impact in the region. The degree of significance will depend on the level of grading and retention of native plant species.	Basic component		Yes Reclaiming equivalent areas with bare and highly erodible soils in the region may be warranted Avoidance-minimization measures to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.), and varied levels of native plant cover retention and/or use of dust suppressants are reasonable alternatives for project-level NEPA analyses.

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Specially Designated Areas - General	Yes Specially designated areas (SDAs) within 25 miles (40 km) of the SEZ that could be impacted by solar development. The SEZ is readily visible from the Cumbres & Toltec Scenic Railway, Los Mogotes Peaks, the San Antonio ACEC and WSA, the San Antonio WSA, and visitors to the Rio Grande del Norte National Monument.	Possible	Potentially High Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA. For visual impacts, full development of the SEZ with solar facilities would cause moderate to strong visual contrasts that could not be hidden from view from the specially designated areas.	Highly Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare). The Visual Impact Assessment (Sullivan et al. 2016) identified major visual impacts for relatively large numbers of potentially sensitive viewers at the Cumbres & Toltec Scenic Railway, and for some viewpoints within the Rio Grande del Norte National Monument. SEZ-specific programmatic design features require that early consultation be initiated with the Sangre de Cristo NHA, in order to understand how development of the SEZ could be consistent with NHA plans and goals.	Human element		Yes The Visual Impact Assessment (Sullivan et al. 2016) identified the following specially designated areas as potentially warranting compensatory mitigation: Cumbres and Toltec Scenic Railroad and the Rio Grande del Norte National Monument.
Specially Designated Areas - Lands with Wilderness Characteristics (LWC)	Yes.	Highly	Potentially High	Moderately High	Human element	BLM can manage various aspects of its multiple use mandate. This determination is made through land use planning and project-specific NEPA and may or may not focus on LWC inventoried land or solar energy development.	Possibly

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR ANTONITO SOUTHEAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Impact?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the Antonito Southeast SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Transportation	No	Probable Vehicle routes currently open within the SEZ could be closed or rerouted.	Low	Low	Human element	Local roads improvements will be made to accommodate additional traffic.	No
Visual	Yes The SEZ is readily visible from the West Fork of the North Branch of the Old Spanish Trail segment under study, to travelers on U.S. 285, and to viewers at the "Welcome to Colorful Colorado" roadside sign, as well as from some specially designated areas.	Certain	Potentially High Depends on locations of development within the SEZ and project-level NEPA.	Highly Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare). The Visual Impact Assessment (Sullivan et al. 2016) identified major visual impacts for relatively large numbers of potentially sensitive viewers at some viewpoints on U.S. 285, the West Fork of the North Branch of the Old Spanish Trail segment under study, as well as some specially designated areas. There would also be major visual impacts at the "Welcome to Colorful Colorado" roadside sign.	Human element	For visual impacts, full development of the SEZ with solar facilities would cause moderate to strong visual contrasts that could not be hidden from view from some specially designated areas and other visually sensitive areas.	Yes The Visual Impact Assessment (Sullivan et al. 2016) identified residual impacts potentially warranting compensatory mitigation both within the SEZ and for nearby visually sensitive areas.
Wild Horses & Burros	No				Land use		No

Endnotes:

[i] Landscape reasoning: While somewhat distant to people and households, potential future Antonito Southeast SEZ noise sources would occur in a landscape where wildlife experience large-scale modification of the acoustic environment. As an example 29% of habitat (~1,041,000 acres) for 3 BLM sensitive species (burrowing owl, Gunnison's prairie dog, and mountain plover) in the San Luis Valley-Taos Plateau ecoregion is currently highly or very highly modified by human development, and future human development and associated noise sources, are projected to increase to 37% of the landscape by 2030 (Walston et al. 2016).

In a regional geographic context, Antonito Southeast SEZ changes to the acoustic environment would occur in the portion of the San Luis Valley-Taos Plateau adjacent to the Rio Grande del Norte National Monument where natural state is an object of Presidential Proclamation (White House 2013).

[ii] Potential residual impacts from Antonito Southeast SEZ disturbance and new sources of fugitive dust generation would occur within a San Luis Valley-Taos Plateau region where 22% of the landscape (~1,094,000 acres) of the soil is currently highly to very highly impacted by human development, contributing to spring dust events and where developed landscapes are projected to increase to 29% landscape coverage by 2030 (Walston et al. 2016).

Residual air quality impacts from soil disturbance at the scale of Antonito Southeast SEZ would occur in a landscape where 34% of land cover is subject to high and very high temperature-precipitation effects of climate change, which influence drought severity and plant cover productivity, and exacerbate soil susceptibility to dust generation (Chang et al. 2016).

[iii] High to very high degraded acreage from human development and climate change in the basin grassland and shrubland vegetation type characteristic of the Antonito Southeast SEZ are also expected to double in the SEZ region by 2030, further establishing ecological downward trend in SEZ region (Walston et al. 2016).

[iv] High to very high degraded acreage from human development and climate change in the basin grassland and shrubland vegetation type characteristic of the Antonito Southeast SEZ are also expected to double in the SEZ region by 2030 (Walston et al. 2016).

[v] Moderately high significance is expected from impacting wildlife migration routes and overall habitat acreage for wildlife species ranging between Colorado and New Mexico's Rio Grande del Norte National Monument and the Taos Plateau. Wildlife habitat is an object of Presidential Proclamation (White House 2013). Presuming an 80% development level on 9,700 acres and a configuration that spans 5 miles parallel to the San Antonio River corridor, residual impacts for movement of big game are expected to be moderately high and movement to the north for pronghorn, and possibly other big game, will be greatly reduced or altered.

Moderate ecological significance is expected for residual impacts from SEZ development on groundwater resources depending on the methods used for development due to cumulative effects. Compounding effects include climate change, declining aquifers, and competing demands on the water resource. Currently, habitat in the landscape is already highly to very highly impacted by climate change with large magnitude increases expected by 2030. Two habitats more impacted by climate change are pronghorn habitat showing 11% highly to very highly impacted in the landscape with a projection of increasing to 27% by 2030. Likewise, grassland fauna habitat is expected to change from 8% highly or very highly modified by climate change to 22% by 2030 (Walston et al. 2016).

[vi] Migrating waterbirds also have high potential for residual impacts largely due to the significance of the flyway in this area. There is a high potential for collisions with the solar arrays and high expenditure of energy from flying to the site due to the appearance of water in that more confined location of the San Luis Valley. These impacts are cumulative with human development and climate change effects for these species.

Over 75 species of waterbirds are known to migrate through the San Luis Valley on their way to and from wintering to breeding grounds. Waterbirds are documented as a group that may be highly impacted by solar panels. Human development (categorized as highly to very highly modified) across the landscape in waterbird habitat is currently 32% and projected to be 38% by 2030. Waterbird habitat is currently 29% highly or very highly affected by climate change and those higher level climate impacts are projected to increase

to 34% by 2030 (Walston et al. 2016). Because of these cumulative impacts, and the potential to impact water tables in and around the area, which could further effect the species, residual impacts are high for the waterbird migratory group.

[vii] Cumulative residual impacts include the overall loss of grass and shrubland habitat, increase in roads and disturbance, additive to current and anticipated increases in human development across the landscape (from 29% currently to 37% by 2030 categorized as highly to very highly modified in Gunnison prairie dog habitat). Cumulative effects also include current and projected climate change impacts to these species preferred habitat of shrub and grasslands. Currently, 17% of the landscape is highly or very highly impacted by climate change with a projection of 22% of the shrub/grassland habitat affected by 2030 (Walston et al. 2016).

Moderate residual impacts are expected for the Northern leopard frog. Avoidance measures that protect more prominent water bodies will reduce residual impacts to "moderate", but development on 80% of 9,700 acres will result in loss of availability of ephemeral habitats in the SEZ not showing on the maps but that are important to frogs after rainfall events. Connectivity of these habitats in the SEZ will be greatly reduced and dispersal of species throughout these 9,700 acres will be minimized, especially if grading occurs. Any groundwater changes from operation will also result in residual effects to frogs. Cumulative impacts for the Northern leopard frog would be similar to shorebirds and waterfowl which show 29% of their habitat highly to very highly impacted by climate change currently with an increase to 34% highly to very highly impacted by 2030.

Moderately high residual impacts are expected for the ferruginous hawk and the peregrine falcon because of the loss of 80% of 9,700 acres and increasing risks for collisions with solar arrays while foraging. Minimization measures implemented that reduce perching availability are likely to help, but not eliminate the impacts. Cumulative impacts are expected from SEZ development due to high levels of human development in the landscape for these species, road building, increased traffic, and climate change impacts to the species habitat. Human development categorized as highly to very highly modified currently alters the habitat for ferruginous hawks across the landscape by 49% with a projection of 55% by 2030. Any groundwater changes that affect the vigor or health of the vegetation are likely to affect predator/prey relationships for these species. Any unmitigated water use is likely to create residual impacts by decreasing prey species abundance due to the anticipated 80% development of 9,700 acres as well as cumulative effects from the potential of also developing the Los Mogotes SEZ. Other cumulative effects include human development and invasive species factors that show 15% highly to very highly modified human development in Brewer's sparrow habitat across the landscape with a projection of 27% high to very high development by 2030. This SEZ development is also likely to contribute to residual cumulative effects from invasive species. The current amount of Brewer's sparrow habitat affected by invasives in the landscape is 23% whereas projections indicate their habitat may be affected by invasives at a level of 48% by 2030. Any groundwater changes in the area and/or surrounding area from the project are likely to have cumulative impacts additive to climate change affecting vegetative vigor for these species nesting and foraging habitats.

Moderately high residual impacts for the swift fox. Residual impacts to swift fox would occur due to their high degree of habitat specificity and inability to disperse long distances, unlike other canids. The 80% development of the 9,700 acres and the cumulative effects of the potential development of Los Mogotes SEZ would decrease availability and abundance of prey for swift fox, a species that may cover 8-10 km^2 in a single night while foraging. Swift fox overall habitat quality would be affected by human development. Currently 29% of the area has very high or high human development, while in 2030 projections indicate that 37% of the area will have very high or high human development. The anticipated future conditions would further limit foraging, prey abundance, and potential denning sites for swift fox.

Moderately high impacts for the Brewer's sparrow and the mountain plover are expected

Low to moderate residual impacts for the big free-tailed bat are expected due to the anticipated 80% development of 9,700 acres as well as cumulative effects from the potential of also developing Los Mogotes SEZ. The loss of habitat would reduce the amount of vegetation and insects that the Mexican free-tailed depends on for prey and the bat would

have limited capacity to forage within any developed SEZ. Invasive species could affect species diversity and richness and overall abundance of prey species. Currently, 47% of the area is at high or very high impacts from invasives, while 2030 projections indicate that 65% of the area will experience high or very high levels of invasives. The Mexican free-tailed bat roosts in large colonies and is susceptible to large population declines when disturbed by human development. In 2030 human development could be at high or very high levels in 31% of the landscape and 23% of the landscape is currently at those levels.

[viii] Potential residual impacts from Antonito Southeast SEZ disturbance and new sources of fugitive dust generation would occur within a San Luis Valley-Taos Plateau region where 23% of the soil landscape (~1,094,000 acres) is currently highly or very highly modified by human development, contributing to spring dust events and where developed landscapes are projected to increase to 29% landscape coverage by 2030 (Walston et al. 2016).

Residual air quality impacts from soil disturbance at the scale of Antonito Southeast SEZ would occur in a landscape where 34% of land cover is subject to high and very high temperature-precipitation effects of climate change, the latter which influence drought severity, plant cover productivity, & exacerbate soil susceptibility to dust generation

[ix] All these processes could lead to increased erosion, sediment transport, and sediment deposition impacts. The modification of ephemeral water bodies could also result in some parts of the developed area receiving less water as the result of concentrating drainage patterns. Residual impacts depend on the level of retention of native plant cover and the extent of grading.

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EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR DE TILLA GULCH SOLAR ENERGY ZONE							
Resource/ Issue	Residual or Unavoidable Impacts?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the De Tilla Gulch SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Acoustics	Probable Terrestrial wildlife, birds, bats	Probable Noise level depends on technology, construction and operational phase traffic	Low Context: Moderate current ambient noise on site. Intensity & Duration: Construction-phase noise limited, operation-phase traffic noise levels 30+ years or permanent change	Moderately Residual operational-phase noise impacts resulting from 80% build out of 1,064 acre SEZ, would be of long duration: (minimum of 30 years) and cumulative to noise sources from the nearby Highway 285 and Saguache County Land fill, but relatively minor. *See also Endnote [i]*	Noise associated with solar development on the SEZ represents a Human Element that also impacts wildlife.		Possibly When considered cumulative to impacts associated with loss of 1,064 acres of vegetation-habitat for terrestrial wildlife, sensitive species, raptors, and migratory birds

[1] BLM Technical-IDT Assessment Rating: Yes, Probable, Possible, Unlikely, No

[2] BLM Technical-IDT Assessment Rating: Certain, Probable, Possible, Unlikely, No

[3] BLM Technical-IDT Assessment Rating: Highly, Potentially Highly, Moderately Highly, Moderately, Low

[4] BLM Technical-IDT Assessment Rating: Highly, Potentially Highly, Moderately Highly, Moderately, Low. Status and trend of the resource evaluated on the basis of landscape assessment data (Walston et al. 2016 and Wescott et al. 2016) for current distribution and predicted effects of change agents, other baseline data sources (see http://www.blm.gov/co/st/en/fo/slvfo/solar/solar_regional_mitigation.html), and IDT specialist subject matter expertise.

[5] Walston et al. 2016, Conservation Element-Specific Conceptual Models.

[6] BLM Technical-IDT Assessment Rating: Yes, Possibly, No

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR DE TILLA GULCH SOLAR ENERGY ZONE							
Resource/ Issue	Residual or Unavoidable Impacts?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the De Tilla Gulch SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Air Quality	Possibly Depending on level and timing of SEZ build out, and particularly native plant cover retention scenarios	Possibly Under the Solar PEIS ROD (BLM 2012) grading assumptions and 80% build out scenario for a 1,043 acre SEZ that does not specify native plant cover retention. Level of residual impact on-site depends on extent of site grading, level of new road construction, traffic, degree of retention of native plant cover, and/or use of dust suppressants.	Moderately Considered PM10 avoidance and minimization measures core to residual impact onsite significance. The duration of construction-phase fugitive dust would be limited for any individual SEZ project with trafficked access routes likely mitigated by use of dust suppressants The extent of 80% build out scenario, (roughly equivalent acreage to 6.5 fallowed center-pivot irrigation fields) is not insignificant. .	Moderately Aggregated residual air quality impacts from dust (PM10 – PM 2.5) in a region and air basin (San Luis Valley) that annually experiences seasonal dust storms and measured events exceeding 400 ppm PM10, along with associated public health effects to sensitive populations Landscape: Residual impacts could result from 80% build-out of the 1,064 acre SEZ, specifically new fugitive dust, to undeveloped areas in this air basin. *See also endnote [ii]*	Air emissions associated with solar development on the SEZ represent a Human Element that also impacts wildlife.	The potential residual impacts resulting from use of dust suppressant at SEZ-scales on multiple projects over the 20-yr assessment period are unknown, and depend on the extent of 1,064 acre SEZ where suppressants are applied.	Possible Avoidance-minimization measures to reduce potential for fugitive dust generation based on technology (e.g. solar array mounting systems, panel height, etc.), level of retention of native plant cover and/or use of dust suppressants are reasonable alternatives for project-level NEPA analysis. Dust monitoring or dust studies should be used to identify, validate, or invalidate dust avoidance measures and inform adaptive management in De Tilla Gulch SEZ development. Findings to be informed by dust impact modeling (Cheng et al. 2015).
Climate Change	No						No

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Resource/ Issue	Residual or Unavoidable Impacts?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the De Tilla Gulch SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Cultural	Yes	Possible	Depends on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and pre-development cultural inventory and evaluation.		Human Element		Possibly Impacts warranting mitigation to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and coordination with stakeholders.

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR DE TILLA GULCH SOLAR ENERGY ZONE							
Resource/ Issue	Residual or Unavoidable Impacts?[1]	How certain is it that the residual impacts will occur?[2]	How significant are the residual impacts onsite?[3]	How significant are the residual impacts of developing the De Tilla Gulch SEZ in the region (San Luis Valley-Taos Plateau)?[4]	Role in the ecosystem?[5]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[6]
Ecology: Vegetation and Riparian Areas	Yes	Certain Many impacts to riparian areas can be mitigated onsite by avoiding development in riparian areas and by the installation of engineering controls on surface water runoff/erosion.	Highly The extent of an 80% De Tilla Gulch SEZ build out scenario, (roughly equivalent acreage to 6.6 center-pivot irrigation fields at 160 acres) includes loss of important winterfat-shortgrass vegetation and represents significant onsite big-game habitat conversion and fragmentation. Project-level NEPA vegetation avoidance alternatives may result in retaining some or replanting vegetation.	Moderately Winterfat-short grass basin shrub-grassland loss at De Tilla Gulch SEZ scale (1,064 acres) and 80% build out scenario represents a regionally minor acreage but considerable winter range habitat loss and fragmentation. Any soil disturbance also affects ground nesting pollinators and host plant reproduction. Ground nesting pollinators are the most dominate pollinators in these systems. <u>Landscape:</u> Potential residual impacts to vegetation from De Tilla Gulch SEZ development would occur within a San Luis Valley-Taos Plateau region where 45% of the basin grassland and shrubland, (~737,854 acres) is projected to be moderately to very highly degraded and be subject to invasive species invasion by 2030, yet further reducing vegetation productivity in a landscape already 20% degraded from that ecological system change agent, (Walston et al. 2016). *See also endnote* [iii]	Basic Component	SEZ Vegetation Management Plan needs to include best management practice (BMPs) for pollinators	Yes As a critical component of a functioning ecosystem. When possible, native soils and vegetation should be left undisturbed and solar arrays should be placed on these undisturbed areas. Avoidance-minimization measures to maintain the highest degree of retention of native plant cover, foster low stature vegetation growth, and to reduce potential for fugitive dust generation based on technology (e.g. solar array mounting systems, panel height, etc.) are reasonable alternatives for project-level NEPA.

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Invasive & Noxious Weeds	Yes	Certain Vegetation management plan requirements, including weed management strategy, will reduce but not eliminate risk of spread of invasive and noxious weeds at 80% SEZ build-out scale.	Moderately Design features can greatly reduce, but not eliminate the risk of establishment and spread of invasive species. The extent of an 80% De Tilla Gulch SEZ build out scenario is roughly equivalent acreage to 6.5 center-pivot irrigation fields at 160 acres and represents a moderate change in invasive species spread risk.	High Disturbance and/or loss of winterfat-short grass shrub-grassland at De Tilla Gulch SEZ scale (1,064 acres) and 80% build out scenarios represent a regionally moderate acreage and moderate degree of native ground cover loss and increased invasive risk. <u>Landscape:</u> Potential residual impacts to vegetation from De Tilla Gulch SEZ development would occur within a San Luis Valley-Taos Plateau region where 45% of the basin grassland and shrubland, (~737,854 acres) is projected to be moderately high to very highly degraded and be subject to invasive species invasion by 2030, yet further reducing vegetation productivity in a landscape already 20% degraded from that ecological system change agent, (Walston et al. 2016). *See also endnote [iv]*	Change Agent		Possibly As a critical component of a functioning ecosystem and high-cost land management action. When possible, the native soils and vegetation should be left undisturbed and solar arrays should be placed on these undisturbed areas Avoidance-minimization measures to maintain the highest degree of retention of native plant cover, foster low stature vegetation growth, and to reduce vegetation disturbance based on technology (e.g. solar array mounting systems, panel height, etc.) are reasonable alternatives for project-level NEPA.

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Ecology: Terrestrial Wildlife & Aquatic Biota	Yes	Certain	Moderately Highly Expect the loss of habitat for most general wildlife species over the entire developable area.	Potentially Highly Potentially high ecological significance from residual impacts due to overall extent of habitat loss (80% of 1,064 acres) for grassland fauna. <u>Landscape:</u> Potentially high significance likely from residual cumulative impacts from SEZ development due to additive impacts for grassland fauna with human development across the larger landscape, as well as position configuration of SEZ for animal movement corridor, specifically pronghorn. Currently, 29% of the landscape for grassland fauna is highly or very highly modified and is expected to increase to 37% by 2030. Likewise, pronghorn, elk, and migration habitat are highly or very highly modified across the larger landscape at levels of 30%, 19%, and 8%, respectively, and are expected to increase to 35%, 26%, and 14%, respectively, by 2030. *See also endnote [v]*	Basic Component		Yes As a critical component of a functioning ecosystem, but less than the Antonito Southeast and Los Mogotes East SEZs.

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Ecology: Migratory Birds, Raptors, Eagle	Yes	Probable Based on inference to FWS-BLM monitoring (2012-2014) at Palen and Desert Sunlight solar facilities in California. Migratory bird, eagles, raptor monitoring data needed.	Moderately Highly Significance level will be re-evaluated when more monitoring data is available.	Moderately Highly There is moderate potential for impact to golden eagle, ferruginous hawk, sandhill cranes, and other migrating birds due to risk of collisions with the solar arrays in addition to the overall loss from 80% development of 1,064 acres of shrub/grassland habitat along this flyway. Cumulative impacts from the factors listed above in addition to increased noise in the SEZ, increased lighting, and increased insects in the development area attracting birds are additive to human development in the landscape. Projections show an increase in human development from the current level of 29% across the larger landscape to 37%, which could result in a higher significance of residual impacts for migrating birds through development of this SEZ. <u>Landscape:</u> Migrating waterbirds also have moderate potential for residual impacts in this SEZ largely due to the significance of the flyway in this area. There is a potential for collisions with the solar arrays and high expenditure of energy from flying to the site due to the appearance of water. These impacts are cumulative with human development and climate change effects for these species. *See also endnote* [vi]	Basic Component		Yes

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Ecology: Plant Special Status Species (SSS)	Possible	Possible Depends on the presence and abundance of special status species.	Moderately Depends on pre-disturbance surveys to identify the presence and abundance of special status species.	Moderately Moderately significant residual impacts for sensitive plants are expected due to the anticipated 80% development of 1,064 acres. Minimization measures implemented that reduce soil disturbance and vegetation loss are likely to help, but not eliminate the impacts. Loss of special status species habitat or occurrence of sensitive plants is a regional concern when considered at the San Luis Valley – Taos Plateau ecological scale and relevant to long-term conservation of special status species.	Basic Component (along with other vegetation)	Mitigation of impacts to special status species is required by BLM policy.	Possible

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Ecology: Animal Special Status Species (SSS)	Yes	Certain Loss of habitat is certain. Loss of SSS animals is possible.	Moderately High Expect the total loss of habitat for SSS animal species over the entire developable area.	Moderately High Aggregate habitat loss and fragmentation impacts resulting from 80% build out of 1,064 acres to 10 BLM Terrestrial Special Status Species is a regional concern when considered at the San Luis Valley – Taos Plateau ecological scale and relevant to long-term conservation of big free-tailed & Mexican free-tailed bats, Gunnison's prairie dog, burrowing owl, swift fox, ferruginous hawk, Brewer's sparrow, mountain plover, and Northern leopard frog. <u>Landscape</u>: Moderately significant residual impacts are still anticipated for Gunnison's prairie dog and burrowing owl. Avoidance measures protecting occupied habitat will reduce residual impacts; however, impacts would still be present because of overall habitat loss (80% of 1064 acres), some loss of connectivity of habitat, and cumulative effects. *See also endnote [vii]*	Basic Component (along with other wildlife)	Mitigation of impacts to special status species is required by BLM policy.	Yes

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Environmental Justice	Yes See also Air Quality.	Possible Depends on the level of fugitive dust generated, noise levels; and water, grazing, visual, socio-economic, recreational, cultural, and hunting impacts. Additionally, depends on whether impacts to sensitive populations are disproportionate.	Moderately The duration of construction-phase fugitive dust would be limited for any individual SEZ project with trafficked access routes likely mitigated by use of dust suppressants However, potential residual impacts resulting from use of dust suppressant at SEZ-scales on multiple projects over the 20-yr assessment period are unknown, and large assumed for the 1,064 acre SEZ.	Moderately Residual air quality impacts in a region and air basin that annually experiences seasonal dust storms and measured PM10 events exceeding 400 ppm, and associated public health effects to sensitive populations. <u>Landscape</u> Landscape level impacts disproportionately impacting sensitive populations are particularly likely to be associated with dust, cultural, and visual impacts. Potential residual impacts from De Tilla Gulch SEZ disturbance and new sources of fugitive dust generation would occur within a San Luis Valley-Taos Plateau region where 22% of the soil landscape (~1,094,000 acres) is currently highly or very highly modified by human development, contributing to spring dust events and where developed landscapes are projected to increase to 29% landscape coverage by 2030 Walston et al. 2016)	Human Element		Possibly

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Hydrology: Surface Water and Water Quality	Yes Development of the SEZ may alter ephemeral stream channels that can impact runoff and groundwater recharge. Reductions to the connectivity of these areas with surface waters and groundwater could limit water availability and thus alter the ability of the area to support vegetation growth and diversity, generating critical habitat areas and connecting wildlife corridors.	Certain Based on SEZ grading assumptions and 80% build out scenario that does not specify native plant cover retention, there would be residual impacts on flow timing and routing, loss of ephemeral stream networks and alterations of natural drainage patterns. *See also endnote [viii]*	Low The SEZ is located within two HUC-12 watersheds. About 793 acres of land would be disturbed within one of the watersheds that has an area of 47,300 acres. The disturbance rate would be about 2% of this watershed. The other watershed would have a 0.2% disturbance rate. Based on the disturbance rating, onsite residual impacts on these three watersheds would be low.	Moderately Although the total disturbance area of the SEZ with respect to the region is very minimal, currently 26% of the region has experienced high human development and 19% of the region has been highly impact by climate change. In addition, the region surface water is scarce, with mostly ephemeral and intermittent streams. Perennial streams originate in adjacent mountainous ecoregions. Very few lakes or reservoirs are present. Some perennial water bodies are changing to ephemeral. In general, all these impacts on an ecoregion with dry and arid climate, added cumulatively to the proposed SEZ development, would have moderate residual impacts in the region.	Basic Component	Some impacts can be mitigated onsite by avoiding development in the ephemeral drainages and by the installation of engineering controls on surface water runoff/ erosion. Dependent on the level/type of dust suppressant used during SEZ development, there would be impacts on surface water quality	Yes Depending on the level of grading and retention of native plant species. Avoidance-minimization measures to maintain the highest degree of retention of native plant cover and to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.) are reasonable alternatives for project-level NEPA.

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Hydrology: Groundwater Quality & Availability	Yes The nature of the solar technology deployed will dictate water requirements. Onsite mitigation will reduce, but will not eliminate the need for water.	Certain Depends on the level of water demands of the development and whether the subsurface hydrology is affected	Moderately Groundwater withdrawals for SEZ development may cause declines in groundwater elevations that can impact water availability for surface water features, vegetation, and ecological habitats	Moderately The De Tilla Gulch SEZ is located in the Rio Grande Basin. The combined groundwater withdrawals for a solar energy facility and other withdrawals and uses in the basin could exceed the sustainable yield and dewater the aquifer to the degree that nearby water wells and other water bodies are adversely affected. Depending on solar technology deployed, groundwater withdrawals exceeding the sustainable yield of the groundwater basin could cause permanent loss of storage capacity in the aquifer. However, the strict management of water resources in the Rio Grande Basin acts to ensure that any impacts from a new water use would be minimal.	Basic Component	Groundwater depletion from the basin continues to increase. The total cumulative depletion of groundwater storage starting from 1900 to 2000 is about 3.3 km3 and from 1900 through 2008 is about 3.6 km3 (Konikow 2013). Dependent on the level/type of dust suppressant used during SEZ development, there would be impacts on groundwater quality.	Yes Depends on technology used and on compensation requirements
Lands & Realty	No By regulation, any new activity must occur in deference to existing rights. Thus, potential impacts have been avoided.						No

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Livestock Grazing	Probable	Probable Assuming 80% SEZ build-out and residual impacts on 1 grazing allotment.	Moderately	Low Winterfat-short grass basin shrub-grassland loss at De Tilla Gulch scale (1,064 acres) and 80% build out scenario represents a regionally moderate acreage of public grazing land conversion.	Land Use	IM No. 2013-142 states that regional mitigation for loss of AUMs is not required. Rio Grande del Norte National Monument Planning.	No However, reimbursement for loss of range improvements will be addressed in project-specific NEPA.
Military & Civilian Aviation	No						No
Minerals	No					Lands have been withdrawn from location or entry under the mining laws.	No
Native American Concerns	Yes	Probable Traditionally-important plants will likely be destroyed and habitat for traditionally-important animals will likely be lost.	See vegetation and wildlife sections in this table.	Residual impacts to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses.	Human element		Unknown at this time. Consultation on project applications will determine whether regional mitigation for may be warranted.
Paleontology	No						No

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Recreation	Possible	Probable Depends on mitigation measures implemented on the basis of project-level NEPA.	Low Relatively little recreation currently occurs in the SEZ. If new vehicle routes are established, a NEPA analysis would be required for those routes.	Low			No
Socioeconomics	Possible Over the course of a 30-year BLM right-of-way permit, some private sector employment, potential future but uncertain federal-state revenue sharing; county cost-of-services; grazing & current recreational activity preclusion (e.g. hunting). Indirectly influences wider SLV water markets and private land markets for renewable energy.	Possible	Moderately Depends on mitigation measures implemented on the basis of project-level NEPA	Moderately Full De Tilla Gulch SEZ build-out scenario (80% of 1,064 acres over a 20 year period), with up to 170 MW potential, would represent a moderate direct and indirect social and economic influence on Saguache County, the San Luis Valley, Colorado as well as western and local renewable energy markets in terms of federal revenue, employment & services, housing, county cost-of-services, land use foregone (e.g. grazing, recreation), potential but uncertain impact to regional tourism, quality of life, and other social and economic cost-benefit and/or trade-offs	Human element		Possibly

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Soils/Erosion	Yes Programmatic design features can but not eliminate reduce soil erosion risk assuming disturbance of up to 851 acres. Level of site grading would be a primary driver of residual impact for full build-out of SEZ. In addition, avoidance (not developing some areas) will minimize the acreage and soil stabilization measures can reduce post disturbance soil erosion.	Certain Based on SEZ grading assumptions and 80% build-out scenario that does not specify native plant cover retention, there would be residual impacts on soils.	Highly Soil disturbance that occurs as a result of construction activities like grading, excavation and backfilling that displace topsoil and disturb the existing soil profile. Such soil disturbances affect vegetation by disrupting indigenous plant communities and facilitating the growth of invasive species. In addition, soil loss due to erosion and deposition by wind and water and surface runoff would occur, resulting in sedimentation	Highly Although the total disturbance area of SEZ with respect to the region is very minimal, currently 26% of the region has high experienced high human development and 19% of the region has been highly impacted due to climate change, topsoil loss by wind and water erosion would have residual impact in the region. The degree of significance will depend on the level of grading and retention of native plant species.	Basic component		Yes Reclaiming equivalent areas with bare and highly erodible soils in the region may be warranted Avoidance-minimization measures to reduce potential for soil erosion and fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.), and varied levels of native plant cover retention and/or use of dust suppressants are reasonable alternatives for project-level NEPA analyses.

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Specially Designated Areas - General	Yes Specially designated areas (SDAs) within 25 miles (40 km) of the SEZ that could be impacted by solar development. The SEZ is readily visible from the Old Spanish National Historic Trail.	Possible .	Moderately. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA	Moderately Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare). The Visual Impact Assessment (Sullivan et al. 2016) identified major visual impacts for relatively large numbers of potentially sensitive viewers at the Old Spanish National Historic Trail.	Human element	U.S. 285 nominated as scenic by-way.	Yes The Visual Impact Assessment (Sullivan et al. 2016) identified the following specially designated areas as potentially warranting compensatory mitigation: the Old Spanish National Historic Trail.
Specially Designated Areas - Lands with Wilderness Characteristics (LWC)	No						No
Transportation	No				Human element		No
Visual	Yes The SEZ is readily visible to viewers traveling on U.S. 285 and to residents and visitors to Moffat, as well as from the Old Spanish National Historic Trail (a specially designated area).	Certain	Potentially High Depends on locations of development within the SEZ and project-level NEPA.	Highly Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare). The Visual Impact Assessment (Sullivan et al. 2016) identified major visual impacts for some viewpoints on U.S. 285. Moderate visual impacts were identified for the residents and visitors to the community of Moffat.	Human element	For visual impacts, full development of the SEZ with solar facilities would cause moderate to strong visual contrasts that could not be hidden from view from some specially designated area, and other visually sensitive areas.	Yes, The Visual Impact Assessment (Sullivan et al. 2016) identified residual impacts potentially warranting mitigation both within the SEZ and for nearby visually sensitive areas.
Wild Horses & Burros	No				Land use		No

Endnotes:

[i] Landscape Reasoning - While proximate to some households, potential future De Tilla Gulch SEZ noise sources would occur in a landscape where wildlife experience large-scale modification of the acoustic environment. As an example, 29% of habitat (~1,041,000 acres) for 3 BLM sensitive species (burrowing owl, Gunnison's prairie dog, and mountain plover) in the San Luis Valley-Taos Plateau ecoregion is currently highly or very highly modified by human development, and future human development and associated noise sources are projected to increase to 37% of the landscape by 2030 (Walston et al. 2016).

In a regional geographic context, SEZ changes to the acoustic environment occur in a more developed portion of the San Luis Valley-Taos Plateau.

[ii] Potential residual impacts from De Tilla Gulch SEZ disturbance and new sources of fugitive dust generation would occur within a San Luis Valley-Taos Plateau region where 22% of the soil landscape (~1,094,000 acres) is currently highly to very highly impacted by human development, contributing to spring dust events and where developed landscapes are projected to increase to 29% landscape coverage by 2030 (Walston et al. 2016).

Residual air quality impacts from soil disturbance at the scale of De Tilla Gulch SEZ would occur in a landscape where 34% of land cover is subject to high and very high temperature-precipitation effects of climate change, which influence drought severity and plant cover productivity, and exacerbate soil susceptibility to dust generation (Chang et al. 2016).

[iii] High to very high degraded acreage from human development and climate change in the basin grassland and shrubland vegetation type characteristic of the De Tilla Gulch SEZ are also expected to double in the SEZ region by 2030, further establishing ecological downward trend in SEZ region.

[iv] High to very high degraded acreage from human development and climate change in the basin grassland and shrubland vegetation type characteristic of the De Tilla Gulch SEZ are also expected to double in the SEZ region by 2030 (Walston et al. 2016).

[v] Moderate ecological significance is expected for residual impacts from SEZ on groundwater resources due to cumulative effects from expected climate change, declining aquifers, and competing demands on the water resource. This depends on any necessary water use but could result in residual impacts. Currently, habitat in the landscape is already highly to very highly impacted by climate change with large magnitude increases expected by 2030. Two habitats more impacted are pronghorn habitat showing 11 % highly to very highly impacted by climate change with a projection of increasing to 27% by 2030. Likewise, grassland fauna habitat is expected to change from 8% highly or very highly modified by climate change to 22% by 2030 (Walston et al. 2016).

[vi] Over 75 species of waterbirds are known to migrate through the San Luis Valley on their way to and from wintering to breeding grounds. Waterbirds are documented as a group that may be highly impacted by solar panels. Human development (categorized as highly to very highly modified) across the landscape in waterbird habitat is currently 32% and projected to be 38% by 2030. Waterbird habitat is currently 29% highly or very highly affected by climate change and those higher level climate impacts are projected to increase to 34% by 2030. Because of these cumulative impacts, and the potential of affecting water tables in and around the area, which could further affect the species, residual impacts are moderate for the waterbird migratory group relative to other SEZ zones because of the smaller size.

[vii] Cumulative residual impacts include the overall loss of grass and shrubland habitat, increase in roads and disturbance, additive to current and anticipated increases in human development across the landscape (from 29% currently to 37% by 2030 categorized as highly to very highly modified in Gunnison's prairie dog habitat). Cumulative effects also include current and projected climate change impacts to these species preferred habitat of shrub and grasslands. Currently, 17% of the landscape is highly or very highly impacted by climate change with a projection of 22% of the shrub/grassland habitat affected by 2030.

Moderately low residual impacts are expected for the Northern leopard frog, but residual impacts are still present affecting the species. Avoidance measures that protect or avoid the ephemeral drainages will reduce residual impacts to "moderately-low", but development on 80% of 1,064 acres will result in loss of availability of ephemeral habitats in the SEZ not showing on the maps but that are important to frogs after rainfall events. Connectivity of these habitats in the SEZ will be reduced and dispersal of species throughout these 1064 acres will be minimized, especially if grading occurs. Any groundwater changes from operation will also result in residual effects to frogs. Cumulative impacts for the Northern leopard frog would be similar to shorebirds and waterfowl which show 29% of their habitat highly to very highly impacted by climate change currently with an increase to 34% highly to very highly impacted by 2030.

Moderately significant residual impacts are expected or the Ferruginous Hawk and the peregrine falcon because of the loss of 80% of 1,064 acres and increasing risks for collisions with solar arrays while foraging. Minimization measures implemented that reduce perching availability are likely to help, but not eliminate the impacts. Cumulative impacts are expected from SEZ development due to high levels of human development in the landscape for these species, road building, increased traffic, and climate change impacts to the species habitat. Human development categorized as highly to very highly modified currently alters the habitat for ferruginous hawks across the landscape by 49% with a projection of 55% by 2030. Any groundwater changes that affect the vigor or health of the vegetation are likely to affect predator/prey relationships for these species. Any unmitigated water use is likely to create residual impacts on prey species abundance.

Moderately significant impacts for the Brewer's sparrow and the mountain plover are expected due to the anticipated 80% development of 1,064 acres in their preferred habitat type. Other cumulative effects include human development and invasive species factors that show 15% (highly to very highly modified) human development in Brewer's sparrow habitat across the landscape currently with a projection of 27% high to very high development by 2030. This SEZ development is also likely to contribute residual cumulative effects to invasive species. Current amount of Brewer's sparrow habitat affected by invasives in the landscape is 23% whereas projections show their habitat affected by invasives at a level of 48% by 2030 contributing to a loss of habitat. Any groundwater changes in the area and/or surrounding area from the project are likely to have cumulative impacts additive to climate change affecting vegetative vigor for these species nesting and foraging habitats.

Moderate residual impacts for the swift fox. Residual impacts to swift fox would occur because their high degree of habitat specificity and inability to disperse long distances, unlike other canids. The 80% development of the 1,064 acres would decrease availability and abundance of prey for swift fox, a species that may cover 8-10 km^2 in a single night while foraging. Swift fox overall habitat quality would be affected by human development. Currently 29% of the area has very high or high human development, while in 2030 projections indicate that 37% of the area will have very high or high human development. The anticipated future conditions would further limit foraging, prey abundance, and potential denning sites for swift fox.

Low to moderate residual impacts for the big free-tailed bat are expected because expected due to the anticipated 80% development of 1,064 acres of the SEZ. The loss of habitat would reduce the amount of vegetation and insects that the Mexican free-tailed depends on for prey and the bat would have limited capacity to forage within any developed SEZ. Invasive species could affect species diversity and richness and overall abundance of prey species. Currently, 47% of the area is at high or very high impacts to invasives,

while 2030 projections indicate that 65% of the area will experience high or very high levels of invasives. The Mexican free-tailed bat roosts in large colonies and is susceptible to large population declines when disturbed by human development. 2030 human development could be at high or very high levels in 31% of the landscape and 23% of the landscape are currently at those levels.

[viii] All these processes could lead to increased erosion, sediment transport, and sediment deposition impacts. The modification of ephemeral water bodies could also result in some parts of the developed area receiving less water as the result of concentrating drainage patterns. Residual impacts depend on the level of retention of native plant cover and the extent of grading.

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EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR LOS MOGOTES EAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Adverse Impacts?[7]	How certain is it that the residual impacts will occur?[8]	How significant are the residual impacts onsite?[9]	How significant are the residual impacts of developing the Los Mogotes East SEZ in the region (San Luis Valley-Taos Plateau)?[10]	Role in the ecosystem?[11]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[12]
Acoustics	Probable Terrestrial wildlife, birds, bats	Possible Noise level depends on technology, construction and operational phase traffic	Moderately Context: Low current ambient noise on site. Intensity & Duration: Construction-phase noise limited; operation-phase traffic noise levels 30+ years or permanent change.	Moderately Residual operational-phase noise impacts resulting from 80% build out of 2,650 acre SEZ, represent a substantial undeveloped geographic area where new noise would occur would be of long duration: (minimum of 30 years) and cumulative to noise sources from nearby agriculture and Highway 285. *See also endnote [i]*	Noise associated with solar development on the SEZ represents a Human Element that also impacts wildlife.	SEZ noise impacts would be cumulative to vegetation-habitat impacts from 80% build out of the 9,700 acres at Antonito Southeast SEZ and other ongoing activities in the vicinity of the Los Mogotes East SEZ.	Possibly When considered cumulative to impacts associated with loss of 2,650 acres of vegetation-habitat for terrestrial wildlife, sensitive species, raptors, and migratory birds

[7] BLM Technical-IDT Assessment Rating: Yes, Probable, Possible, Unlikely, No

[8] BLM Technical-IDT Assessment Rating: Certain, Probable, Possible, Unlikely, No

[9] BLM Technical-IDT Assessment Rating: Highly, Potentially Highly, Moderately Highly, Moderately, Low

[10] BLM Technical-IDT Assessment Rating: Highly, Potentially Highly, Moderately Highly, Moderately, Low. Status and trend of the resource evaluated on the basis of landscape assessment data (Walston et al. 2016) for current distribution and predicted effects of change agents, other baseline data sources (see http://www.blm.gov/co/st/en/fo/slvfo/solar/solar_regional_mitigation.html), and IDT specialist subject matter expertise .

[11] Walston et al. 2014, Appendix D. Conservation Element-Specific Conceptual Models.

[12] BLM Technical-IDT Assessment Rating: Yes, Possibly, No

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Air Quality	Yes Depending on level and timing of SEZ build out, particularly level of native plant cover retention within SEZ	Certain Under the Solar PEIS ROD (BLM 2012) grading assumptions and 80% build out scenario for 2,650 acres SEZ that does not specify native plant cover retention. Level of residual impact on-site depends on extent of site grading, level of new road construction, traffic, degree of retention of native plant cover, and/or use of dust suppressants	Potentially highly Considered PM10 avoidance and minimization measures core to residual impact onsite significance: The duration of construction-phase fugitive dust would be limited for any individual SEZ project with trafficked access routes likely mitigated by use of dust suppressants The extent of 80% build out scenario, (roughly equivalent acreage to 14 fallowed center-pivot irrigation fields) is large. Calcic soil texture at surface and subsurface potentially exposed to wind erosion is a driving concern.	Potentially highly Aggregated residual air quality impacts from dust (PM10 – PM 2.5) in a region and air basin (San Luis Valley) that annually experiences seasonal dust storms and measured events exceeding 400 ppm PM10, along with associated public health effects to sensitive populations Landscape: Residual impacts could result from 80% build-out of the 2,650 acre SEZ, specifically fugitive dust, to adjacent, downwind community & households in Conejos County. *See also endnote* [ii]	Air emissions associated with solar development on the SEZ represent a Human Element that also impacts wildlife.	Possible concurrent 80% build out of 9,700 acres on Antonito Southeast SEZ in Conejos County. Potential residual impacts resulting from use of dust suppressant at SEZ-scales on multiple projects over the 20-yr assessment period are unknown, and potentially large depending on area of 2,650 acre SEZ where suppressants would be applied.	Possibly Avoidance-minimization measures to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.) and varied levels of native plant cover retention and/or use of dust suppressants are reasonable alternatives for project-level NEPA analysis.) Dust monitoring or dust studies could identify, validate, or invalidate dust avoidance measures and inform adaptive management in Los Mogotes E SEZ development Findings to be informed by dust impact modeling (Cheng et al. 2015).
Climate Change	No						No

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Cultural	Possible	Possible	Depends on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and pre-development cultural inventory and evaluation.		Human Element		Possibly. Impacts warranting mitigation to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses and coordination with stakeholders.

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Ecology: Vegetation and Riparian Areas	Yes	Certain Many impacts to riparian areas can be mitigated onsite by avoiding development in riparian areas and by the installation of engineering controls on surface water runoff/erosion.	Highly The extent of an 80% Los Mogotes E SEZ build out scenario, (roughly equivalent acreage to 14 center-pivot irrigation fields at 160 acres) includes loss of important winterfat-shortgrass vegetation and represents very significant onsite big-game habitat conversion and fragmentation Project-level NEPA vegetation avoidance alternatives may result in retaining and/or restoring some vegetation.	Highly Winterfat-short grass basin shrub-grassland loss at Los Mogotes SE scale (2650 acres) and 80% build out scenario represents an extensive acreage and high degree of habitat loss and fragmentation. Any soil disturbance also affects ground nesting pollinators and host plant reproduction. Ground nesting pollinators are the most dominate pollinators in these systems. <u>Landscape:</u> Potential residual impacts to vegetation from Los Mogotes E SEZ development would occur within a San Luis Valley-Taos Plateau region where 45% of the basin grassland and shrubland, (~737,854 acres) is projected to be moderately to very highly degraded and be subject to invasive species invasion by 2030, yet further reducing vegetation productivity in a landscape already 20% degraded from that ecological system change agent, (Argonne and 2014). *See also endnote [iii]*	Basic Component	Possible concurrent 80% build out of 9,700 acres on Antonito Southeast SEZ in Conejos County and other ongoing activities in the vicinity of the Los Mogotes E SEZ. SEZ Vegetation Management Plan needs to include best management practice (BMPs) for pollinators	Yes As a critical component of a functioning ecosystem. When possible, native soils and vegetation should be left undisturbed and solar arrays should be placed on these undisturbed areas Avoidance-minimization measures to maintain the highest degree of retention of native plant cover, foster low stature vegetation growth, and to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.) are reasonable alternatives for project-level NEPA.

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Invasive & Noxious Weeds	Yes	Certain Vegetation management plan requirements, including weed management strategy, will reduce but not eliminate risk of spread of invasive and noxious weeds at 80% SEZ build-out scale.	High Design features can greatly reduce, but not eliminate the risk of establishment and spread of invasive species. The extent of an 80% Los Mogotes E SEZ build out scenario is roughly equivalent acreage to 14 center-pivot irrigation fields at 160 acres and represents a very large change in invasive species spread risk. .	High Disturbance and/or loss of winterfat-short grass shrub-grassland at Los Mogotes SEZ scale (2,650 acres) and 80% build out scenarios represent a regionally notable acreage and high degree of native ground cover loss and increased invasive risk adjacent to BLM CO sensitive plant populations in the Los Mogotes Area of Critical Environmental Concern. Any soil disturbance also affects ground nesting pollinator and host plant reproduction, impacts those populations and affects plant reproduction. Ground nesting pollinators are the most dominate pollinators in these systems. <u>Landscape:</u> Potential residual impacts to vegetation from Los Mogotes E SEZ development would occur within a San Luis Valley-Taos Plateau region where 45% of the basin grassland and shrubland, (~737,854 acres) is projected to be moderately to very highly degraded and be subject to invasive species invasion by 2030, yet further reducing vegetation productivity in a landscape already 20% degraded from that ecological system change agent, (Walston et al. 2016). *See also endnote [iv]*	Change Agent	Possible concurrent 80% build out of 9.700 acres on Antonito Southeast SEZ in Conejos County and other ongoing activities in the vicinity of the Los Mogotes E SEZ.	Possibly As a critical component of a functioning ecosystem and high-cost land management action. When possible, the native soils and vegetation should be left undisturbed and solar arrays should be placed on these undisturbed areas Avoidance-minimization measures to maintain the highest degree of retention of native plant cover, foster low stature vegetation growth, and to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.) are reasonable alternatives for project-level NEPA.

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Ecology: Terrestrial Wildlife	Yes	Certain	Highly Expect the loss of habitat for most general wildlife species over the entire developable area.	Highly High significance for pronghorn population in the area through overall loss of habitat (80% of 2,650 acres) and substantial disruption of seasonal migration patterns from foothills to agricultural circles and other habitat on the SLV floor. Also significant, particularly for big game, for reducing access to water sources for terrestrial wildlife. Avoidance and minimization measures help but don't eliminate this impact because of need for sight distance around the water for pronghorn in particular. <u>Landscape:</u> This landscape is relatively undeveloped, so there is high significance to grassland fauna from cumulative impacts that include potential development of the Antonito Southeast SEZ, human development, climate change, and invasive species as well as impending changes from groundwater rule-making in the area (fallowing of farmland and change in water levels in some areas). *See also endnote [v]*	Basic Component	There is movement of animals between this SEZ and the Rio Grande Del Norte National Monument and Taos Plateau. Wildlife habitat was identified as one of the objects for which the monument was designated (White House 2013). Consideration of wildlife movements between the SEZ and the Monument are important.	Yes As a critical component of a functioning ecosystem.

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Ecology: Migratory Birds, Raptors, Eagles	Yes	Probable Based on inference to FWS-BLM monitoring (2012-2014) at Palen and Desert Sunlight solar facilities in California. Migratory bird, eagles, raptor monitoring data needed.	Potentially high Significance level will be re-evaluated when more information is available.	Potentially High The Rio Grande Gorge and the larger landscape of the Rio Grande del Norte National Monument is a significant part of a migratory bird flyway and partially designated for that object (migratory birds) in Presidential Proclamation (White House 2013). There is potential for impact to golden eagle, ferruginous hawk, sandhill cranes, and other migrating birds due to risk of collisions with the solar arrays in addition to the overall loss from 80% development of 2,650 acres of shrub/grassland habitat along this flyway. <u>Landscape:</u> Cumulative impacts from the factors listed above in addition to increased noise in the SEZ, increased lighting, and increased insects in the development area attracting birds are additive to human development in the landscape. Projections show an increase in human development from the current level of 29% across the larger landscape to 37% which could result in a higher significance of residual impacts for migrating birds through development of this SEZ. *See also endnote [vi]*	Basic Component	Systematic survey, monitoring, and baseline research under regional ecological conditions required to understand residual or unavoidable impact, deterrence measures and effectiveness for migratory birds, raptors, and eagles	Yes As a key grassland component in the flyway for migrating birds.

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Ecology: Plant Special Status Species (SSS)	Yes *See endnote* [vii]	Certain Loss of habitat is certain. Loss of individual SSS plants is likely (e.g., Ripley's milkvetch) and depends on the presence and abundance of plant SSS.	Moderately Onsite survey required. Expect the total loss of SSS habitat or individual plants and/or habitat in the developable area	Moderately High Moderately high significant residual impacts for sensitive plants are expected due to the anticipated 80% development of 2,650 acres as well as cumulative effects from the potential of also developing Antonito Southeast SEZ. Minimization measures implemented that reduce soil disturbance and vegetation loss are likely to help, but not eliminate the impacts. Loss of special status species habitat or occurrence of sensitive plants is a regional concern when considered at the San Luis Valley – Taos Plateau ecological scale and relevant to long-term conservation of Ripley's milkvetch.	Basic Component (along with other vegetation).	Mitigation of impacts to SSS is required by BLM policy.	Yes

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Ecology: Avian or Terrestrial Special Status Species (SSS)	Yes	Certain Loss of habitat is certain. Loss of SSS animals is possible.	Highly Expect the total loss of habitat for SSS animal species over the entire developable area.	Highly Aggregate habitat loss and fragmentation impacts resulting from 80% build out of 2,650 acres to eight BLM Terrestrial Special Status Species is a regional concern when considered at the San Luis Valley – Taos Plateau ecological scale and relevant to long-term conservation of Gunnison's prairie dog, western burrowing owl, swift fox, ferruginous hawk, Brewer's sparrow, mountain plover, and Northern leopard frog. <u>Landscape</u> Moderately high significance of residual impacts are still anticipated for Gunnison's prairie dog, burrowing owl, and mountain plover: Avoidance measures protecting occupied habitat will reduce residual impacts; however, impacts would still be present because of overall habitat loss (80% of 2,650 acres), loss of connectivity of habitat, and cumulative effects. *See also endnote [viii]*	Basic Component (along with other wildlife).	Mitigation of impacts to SSS is required by BLM policy.	Yes

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Environmental Justice	Yes	Possible Depends on the level of fugitive dust generated, noise levels; and water, grazing, visual, socio-economic, recreational, cultural, and hunting impacts. Additionally, depends on whether impacts to sensitive populations are disproportionate.	Potentially Highly The extent of the 80% build out scenario (roughly equivalent acreage to 14 fallowed center-pivot irrigation fields) is large. Calcic soil texture at surface and subsurface potentially exposed to wind erosion at Los Mogotes E SEZ is a driving human health concern. The duration of construction-phase fugitive dust would be limited for any individual SEZ project with traffic access routes likely mitigated by use of dust suppressants.	Potentially Highly Residual air quality impacts in a region and air basin that annually experiences seasonal dust storms and measured PM10 events exceeding 400 ppm, and associated public health effects to sensitive populations. Conejos County households do not currently experience regional dust events to the extent of households in Alamosa, Costilla, Rio Grande & Saguache Counties. <u>Landscape</u> Landscape level impacts disproportionately impacting sensitive populations are particularly likely to be associated with dust, cultural, and visual impacts. Residual impacts could result from 80% build-out of the 2,650 acre SEZ, specifically fugitive dust, to new areas in the air basin, specifically communities and households in Conejos County downwind of the SEZ, and residual visibility effects to Rio Grande del Norte National Monument in Taos County, NM. *See also endnote* [ix]	Human Element	Concurrent 80% build out of 9,700 acres on Antonito Southeast SEZ in Conejos County. The potential residual impacts resulting from use of dust suppressant at SEZ-scales on multiple projects over the 20-yr assessment period are unknown and assumed to be large for the 2,650 acre SEZ.	Yes The economic benefits of SEZ development to low income and minority populations in Conejos County relative to the direct economic and environmental burden accruing may warrant some level of community directed investments to offset those impacts Avoidance-minimization measures to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.), or based on maintaining the highest degree of retention of native plant cover, are reasonable alternatives for project-level NEPA analysis.

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Hydrology: Surface Water and Water Quality	Yes Development of the SEZ may alter ephemeral stream channels that can impact runoff and groundwater recharge. Reductions to the connectivity of these areas with surface waters and groundwater could limit water availability and thus alter the ability of the area to support vegetation growth and diversity, generating critical habitat areas and connecting wildlife corridors.	Certain Based on SEZ grading assumptions and 80% build out scenario that does not specify native plant cover retention, there would be residual impacts on flow timing and routing, loss of ephemeral stream networks and alterations of natural drainage patterns. *See also endnote [x]*	Low The SEZ is located within three HUC-12 watersheds. About 1,750 acres of land would be disturbed within one of the watershed that has an area of 62,410 acres. The disturbance rate would be about 3% of this watershed. The other two watersheds would have 1.5% and 0.5% disturbance rates. Based on the disturbance rating, onsite residual impacts on these three watersheds would be low.	Moderately Although the total disturbance area of SEZ with respect to the region is very minimal, currently 26% of the region has experienced high human development and 19% of the region has been highly impacted by climate change. In addition, the region surface water is scarce, with mostly ephemeral and intermittent streams. Perennial streams originate in adjacent mountainous ecoregions. Very few lakes or reservoirs are present. Some perennial water bodies are changing to ephemeral. In general, all these impacts on an ecoregion with dry and arid climate, added cumulatively to the proposed SEZ development, would have moderate residual impacts in the region.	Basic Component	Some impacts can be mitigated onsite by avoiding development in the ephemeral drainages and by the installation of engineering controls on surface water runoff/ erosion. Dependent on the level/type of dust suppressant used during SEZ development, there would be impacts on surface water quality.	Yes Depending on the level of grading and retention of native plant species. Avoidance-minimization measures to maintain the highest degree of retention of native plant cover and to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.) are reasonable alternatives for project-level NEPA

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Hydrology: Groundwater Quality & Availability	Yes The nature of the solar technology deployed will dictate water requirements. Onsite mitigation will reduce, but will not eliminate the need for water.	Certain Depends on the level of water demand of the development and whether the subsurface hydrology is affected.	Moderately Highly Groundwater withdrawals for SEZ development may cause declines in groundwater elevations that can impact water availability for surface water features, vegetation, and ecological habitats.	Moderately The Los Mogotes E SEZ is located in the Rio Grande Basin. The combined groundwater withdrawals for a solar energy facility and other withdrawals and uses in the basin could exceed the sustainable yield and dewater the aquifer to the degree that nearby water wells and other water bodies are adversely affected. Depending on the solar technology deployed, groundwater withdrawals exceeding the sustainable yield of the groundwater basin could cause permanent loss of storage capacity in the aquifer. However, the strict management of water resources in the Rio Grande Basin acts to ensure that any impacts from a new water use would be minimal.	Basic Component	Groundwater depletion from the basin continues to increase. The total cumulative depletion of groundwater storage starting from 1900 to 2000 is about 3.3 km3 and from 1900 through 2008 is about 3.6 km3 (Konikow, 2013). Dependent on the level/type of dust suppressant used during SEZ development, there would be impacts on groundwater quality.	Yes Depends on technology used and on compensation requirements.
Lands & Realty	No By regulation, any new activity must occur in deference to existing rights. Thus, potential impacts have been avoided.						No

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Livestock Grazing	Probable	Probable Assuming 80% SEZ build-out and residual impacts on 3 grazing allotments.	Potentially High	Moderately Winterfat-short grass basin shrub-grassland loss at Los Mogotes E scale (2,650 acres) and 80% build out scenarios represents a regionally extensive acreage of public grazing land conversion.	Land Use	IM No. 2013-142 states that regional mitigation for loss of AUMs is not required.	No However, reimbursement for loss of range improvements will be addressed in project-specific NEPA.
Military & Civilian Aviation	No						No
Minerals	No					Lands have been withdrawn from location or entry under the mining laws.	No
Native American Concerns	Yes	Probable Traditionally-important plants will likely be destroyed and habitat for traditionally-important animals will likely be lost.	See Vegetation and Wildlife sections in this table.	Residual impacts to be evaluated based on results of Landscape-Level Cultural Heritage Values and Risk Assessment analyses.	Human element		Unknown at this time. Consultation on project applications will determine whether regional mitigation is warranted.
Paleontology	No						No

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Recreation	Possible	Probable Depends on mitigation measures implemented on the basis of project-level NEPA.	Low Relatively little recreation currently occurs in the SEZ. If new vehicle routes are established, a NEPA analysis would be required for those routes.	Low			No
Socioeconomics	Possible Over the course of a 30-year BLM right-of-way permit, some private sector employment, potential future but uncertain federal-state revenue sharing; county cost-of-services; grazing & current recreational activity preclusion (e.g., hunting). Indirectly influences wider SLV water markets and private land markets for renewable energy	Possible	Moderately Depends on mitigation measures implemented on the basis of project-level NEPA	Moderately Highly Full Los Mogotes SEZ build-out scenario (80% of 2,650 acres over a 20 year period), with up to 424 MW potential, would represent a high direct and indirect social and economic influence on Conejos County, CO, the San Luis Valley, Colorado, northern New Mexico, as well as western and local renewable energy markets in terms of federal revenue, employment & services, housing, county cost-of-services, land use foregone (e.g., grazing, recreation), potential but uncertain impact to regional tourism, Sangre de Cristo National Heritage Area goals, regional cultural sense of place, quality of life, and other social and economic cost-benefit and/or trade-offs.	Human element		Possible

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR LOS MOGOTES EAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Adverse Impacts?[7]	How certain is it that the residual impacts will occur?[8]	How significant are the residual impacts onsite?[9]	How significant are the residual impacts of developing the Los Mogotes East SEZ in the region (San Luis Valley-Taos Plateau)?[10]	Role in the ecosystem?[11]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[12]
Soils/Erosion	Yes Programmatic design features can reduce but not eliminate soil erosion risk assuming disturbance of up to 2,120 acres. Level of site grading would be a primary driver of residual impact for full build-out of SEZ. In addition, avoidance (not developing some areas) will minimize the acreage and soil stabilization measures can reduce post disturbance soil erosion.	Certain Based on SEZ grading assumptions and 80% build-out scenario that does not specify native plant cover retention, there would be residual impacts on soils.	Highly Soil disturbance that occurs as a result of construction activities like grading, excavation and backfilling that displace topsoil and disturb the existing soil profile. Such soil disturbances affect vegetation by disrupting indigenous plant communities and facilitating the growth of invasive species. In addition, soil loss due to erosion and deposition by wind and water and surface runoff would occur, resulting in sedimentation.	Highly Although the total disturbance area of SEZ with respect to the region is very minimal, currently 26% of the region has high experienced high human development and 19% of the region has been highly impacted due to climate change, topsoil loss by wind and water erosion would have residual impact in the region. The degree of significance will depend on the level of grading and retention of native plant species	Basic component		Yes Reclaiming equivalent areas with bare and highly erodible soils in the region may be warranted. Avoidance-minimization measures to reduce potential for fugitive dust generation based on technology (e.g., solar array mounting systems, panel height, etc.), level of retention of native plant cover and/or use of dust suppressants are reasonable alternatives for project-level NEPA analyses.

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR LOS MOGOTES EAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Adverse Impacts?[7]	How certain is it that the residual impacts will occur?[8]	How significant are the residual impacts onsite?[9]	How significant are the residual impacts of developing the Los Mogotes East SEZ in the region (San Luis Valley-Taos Plateau)?[10]	Role in the ecosystem?[11]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[12]
Specially Designated Areas - General	Yes Specially designated areas (SDAs) within 25 miles (40 km) of the SEZ that could be impacted by solar development. The SEZ is readily visible from the Los Caminos Antiguos Scenic Byway, Los Mogotes Peaks, and San Luis Hills ACEC and WSA.	Possible	Moderately Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA.	Low The Visual Impact Assessment (Sullivan et al. 2016) did not identify major visual impacts for SDAs within 25 miles of the SEZ. However, major visual impacts were identified for other visually sensitive areas. SEZ-specific programmatic design features require that early consultation be initiated with the Sangre de Cristo NHA, in order to understand how development of the SEZ could be consistent with NHA plans and goals.	Human element		No.
Specially Designated Areas - Lands with Wilderness Characteristics (LWC)	Yes.	Highly	Potentially High	Moderately High	Human element	BLM can manage various aspects of its multiple use mandate. This determination is made through land use planning and project-specific NEPA and may or may not focus on LWC inventoried land or solar energy development.	No
Transportation	No				Human element		No

EVALUATION OF RESIDUAL IMPACTS THAT MAY WARRANT REGIONAL COMPENSATORY MITIGATION - SUMMARY TABLE FOR LOS MOGOTES EAST SOLAR ENERGY ZONE

Resource/ Issue	Residual or Unavoidable Adverse Impacts?[7]	How certain is it that the residual impacts will occur?[8]	How significant are the residual impacts onsite?[9]	How significant are the residual impacts of developing the Los Mogotes East SEZ in the region (San Luis Valley-Taos Plateau)?[10]	Role in the ecosystem?[11]	Other Considerations	Are potential residual impacts likely to warrant regional mitigation?[12]
Visual	Yes The SEZ is readily visible to travelers on U.S. 285, from the West Fork of the North Branch of the Old Spanish Trail segment under study, and in the community of Romeo, as well as from some specially designated areas.	Certain	Potentially High Depends on locations of development within the SEZ and project-level NEPA.	Highly Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare). The Visual Impact Assessment (Sullivan et al. 2016) identified major visual impacts for some viewpoints along U.S. 285 and the West Fork of the North Branch of the Old Spanish Trail segment under study. Moderate visual impacts were identified for the Community of Romeo.	Human element	For visual impacts, full development of the SEZ with solar facilities would cause moderate to strong visual contrasts that could not be hidden from view from some visually sensitive areas.	Yes The Visual Impact Assessment (Sullivan et al. 2016) identified residual impacts potentially warranting compensatory mitigation both within the SEZ and for nearby visually sensitive areas.
Wild Horses & Burros	No				Land use		No

Endnotes:

[i] Landscape reasoning: While somewhat distant to people and households, potential future Los Mogotes East SEZ noise sources would occur in a landscape where wildlife experience large-scale modification of the acoustic environment. As an example, 30% of pronghorn habitat (~968,000 acres) in the San Luis Valley-Taos Plateau ecoregion is currently highly or very highly modified by human development, and future human development and noise sources are projected to increase to 34.5% of the landscape by 2030 (Walston et al. 2016).

[ii] Potential residual impacts from disturbance and new sources of fugitive dust generation would occur within a San Luis Valley-Taos Plateau region where 22% of the soil landscape (~1,094,000 acres) is currently highly or very highly impacted by human development, contributing to spring dust events, and where developed landscapes are projected to increase to 29% landscape coverage by 2030.

Residual air quality impacts from soil disturbance at the scale of Los Mogotes East SEZ would occur in a landscape where 34% of land cover is subject to high and very high temperature-precipitation effects of climate change, which influence drought severity and plant cover productivity, and exacerbate soil susceptibility to dust generation (Chang et al. 2016)

[iii] High to very high degraded acreage from human development and climate change in the basin grassland and shrubland vegetation type characteristic of the Los Mogotes East SEZ are also expected to double in the SEZ region by 2030, further establishing ecological downward trend in SEZ region (Walston et al. 2016).

[iv] High to very high degraded acreage from human development and climate change in the basin grassland and shrubland vegetation type characteristic of the Los Mogotes East SEZ are also expected to double in the SEZ region by 2030 (Walston et al. 2016).

[v] This relatively undeveloped SEZ is located in a landscape where 29% of the surrounding area has been either highly or very highly modified for grassland fauna and is expected to increase to 37% human development by 2030 resulting in cumulative impacts. Likewise, pronghorn, elk and deer habitat, and migration habitat are currently intact in the SEZ but are highly or very highly modified at levels of 30%, 19%, and 8% respectively across the larger landscape and are expected to increase to 35%, 26%, and 14% respectively by 2030 (Walston et al. 2016).

Climate change will also be cumulative to development of the SEZ and result in residual impacts from development because 11% of pronghorn habitat and 7% of grassland and shrubland are currently highly or very highly impacted by climate change with projections of 26% and 27%, respectively, highly or very highly impacted by 2030.

Moderate significance is expected from impacting wildlife migration routes and overall habitat acreage for wildlife species ranging between Colorado and New Mexico's Rio Grande Del Norte National Monument and the Taos Plateau. Wildlife habitat is an object of Presidential Proclamation (White House 2013). Assuming an 80% development level on 2,650 acres, residual impacts for movement of big game are expected to be moderate between the monument, especially if the Antonito Southeast SEZ is developed and wildlife movement patterns change (Walston et al. 2016).

[vi] Migrating waterbirds also have high potential for residual impacts largely due to the significance of the flyway in the San Luis Valley. There is a moderately high risk potential for collisions with the solar arrays and high expenditure of energy from flying to the site due to the appearance of water in that more confined location of the San Luis Valley. These impacts are cumulative with human development and climate change effects for these species.

Over 75 species of waterbirds are known to migrate through the San Luis Valley on their way to and from wintering to breeding grounds. Waterbirds are documented as a group that may be highly impacted by solar panels. Human development (categorized as highly to very highly modified) across the landscape in waterbird habitat is currently 32% and projected to be 38.3% by 2030. Waterbird habitat is currently 29% highly or very highly affected by climate change and those higher level climate impacts are projected to increase to 34% by 2030 (Walston et al. 2016) Because of these cumulative impacts, and the potential of affecting water tables in and around the area, which could further affect the species, residual impacts are moderately significant for the waterbird migratory group.

[vii] Populations of Ripley's milkvetch, BLM Sensitive Plant Species Astragalus ripleyi, have documented occurrence on lands and soils adjacent to the Los Mogotes East SEZ. Developing 80% of both Los Mogotes and Antonito Southeast SEZ would be expected to result in a total loss to habitat or plants. Level of site grading and disturbance to native vegetation would be a primary driver of residual impact for full build-out of the SEZ. Development in the SEZ would result in alteration of up to 2,650 acres of habitat. If present, little can be done onsite to mitigate the loss of special status plant species that may be present within the SEZ. Avoidance of individual plants may not be practical.

[viii] Cumulative residual impacts include the overall loss of grass and shrubland habitat, increase in roads and disturbance additive to current and anticipated increases in human development across the landscape (from 29% currently to 37% by 2030 categorized as highly to very highly modified in Gunnison's prairie dog habitat).

Cumulative effects also include current and projected climate change impacts to these species preferred habitat of shrub and grasslands. Currently, 17% of the landscape is highly or very highly impacted by climate change with a projection of 22% of the shrub/grassland habitat affected by 2030.

Moderate residual impacts are expected for the Northern leopard frog. Avoidance measures that protect the ephemeral draws will reduce residual impacts to "moderate", but development on 80% of 2,650 acres will result in loss of availability of ephemeral habitats in the SEZ not showing on the maps but that are important to frogs after rainfall events. Connectivity of these habitats in the SEZ will be greatly reduced and dispersal of species throughout these 2,650 acres will be minimized, especially if grading occurs. Any groundwater changes from operation will also result in residual effects to frogs. Cumulative impacts for the northern leopard frog would be similar to shorebirds and waterfowl which show 29% of their habitat highly to very highly impacted by climate change currently with an increase to 34% highly to very highly impacted by 2030.

Moderately high residual impacts are expected for the ferruginous hawk and the peregrine falcon because of the loss of 80% of 2,650 acres and increasing risks for collisions with solar arrays while foraging. Minimization measures implemented that reduce perching availability are likely to help, but not eliminate the impacts. Cumulative impacts are expected from SEZ development especially if the Antonito Southeast SEZ is developed but also due to projected increases for human development in the landscape, road building, increased traffic, and climate change impacts to the species habitat. Human development categorized as highly to very highly modified currently alters the habitat for ferruginous hawks across the landscape by 49% with a projection of 55% by 2030.

Moderate impacts for the Brewer's sparrow are expected due to the anticipated 80% development of 2,650 acres as well as cumulative effects from the potential of also developing Antonito Southeast SEZ. Other cumulative effects include human development and invasive species factors that show 15% highly to very highly modified human development in Brewer's sparrow habitat across the landscape with a projection of 27% high to very high development by 2030. This SEZ development is also likely to contribute residual cumulative effects to invasive species. Current amount of Brewer's sparrow habitat affected by invasives in the landscape is 23% whereas projections show their habitat affected by invasives at a level of 48% by 2030.

Moderate residual impacts for the swift fox. Residual impacts to swift fox would occur because their high degree of habitat specificity and inability to disperse long distances, unlike other canids. The 80% development of the 2,650 acres and the cumulative effects of the potential development of Antonito Southeast SEZ would decrease availability and abundance of prey for swift fox, a species that may cover 8-10 km^2 in a single night while foraging. Swift fox overall habitat quality would be affected by human development. Currently 29% of the area has very high or high human development, while in 2030 projections indicate that 37% of the area will have very high or high human development. The anticipated future conditions would further limit foraging, prey abundance, and potential denning sites for swift fox.

Low to moderate residual impacts for the big free-tailed bat are expected because expected due to the anticipated 80% development of 2,650 acres as well as cumulative effects from the potential of also developing Antonito Southeast SEZ. The loss of habitat would reduce the amount of vegetation and insects that the Mexican free-tailed depends on for prey and the bat would have limited capacity to forage within any developed SEZ. Invasive species could affect species diversity and richness and overall abundance of prey species. Currently, 47% of the area is at high or very high impacts to invasives, while 2030 projections indicate that 65% of the area will experience high or very high levels of invasives. The Mexican free-tailed bat roosts in large colonies and is susceptible to large population declines when disturbed by human development. In 2030 human development could be at high or very high levels in 31% of the landscape and 23% of the landscape is currently at those levels (Walston et al. 2016).

[ix] Potential residual impacts from Los Mogotes East SEZ disturbance and new sources of fugitive dust generation would occur within a San Luis Valley-Taos Plateau region where 22% of the soil landscape (~1,094,000 acres) is currently highly or very highly modified by human development, contributing to spring dust events and where developed landscapes are projected to increase to 29% landscape coverage by 2030 (Walston et al. 2016).

Residual air quality impacts from soil disturbance at the scale of the Los Mogotes East SEZ would occur in a landscape where 34% of land cover is subject to high and very high temperature-precipitation effects of climate change, the latter which influence drought severity, plant cover productivity, and exacerbate soil susceptibility to dust generation.

[x] All these processes could lead to increased erosion, sediment transport, and sediment deposition impacts. The modification of ephemeral water bodies could also result in some parts of the developed area receiving less water as the result of concentrating drainage patterns. Residual impacts depend on the level of retention of native plant cover and the extent of grading.

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Chang, Y.-S., R. Kotamarthi, T. Patton, H. Hartmann, and M. Finster. 2016. *Modeling of Dust Levels Associated with Potential Utility-Sale Solar Development in the San Luis Valley-Taos Plateau Study Area – Final Report*. ANL/EVS-16/4. Environmental Science Division, Argonne National Laboratory, Argonne, Illinois. Prepared for U.S. Department of the Interior, Bureau of Land Management. July.

Konikow, L.F. 2013, Groundwater depletion in the United States (1900−2008): U.S. Geological Survey Scientific Investigations Report 2013−5079, 63 p., http://pubs.usgs.gov/sir/2013/5079.

Sullivan, R., J. Abplanalp, E. Zvolanek, and J. Brown. 2016. *Visual Resource Analysis for Solar Energy Zones in the San Luis Valley.* ANL/EVS-16/6. Environmental Science Division, Argonne National Laboratory, Argonne, Illinois and Bureau of Land Management, San Luis Valley Public Field Office, U. S. Department of the Interior, Bureau of Land Management. Prepared for U.S. Bureau of Land Management, Colorado State Office. January.

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Wescott, K.L., J.M. Abplanalp, J. Brown, B. Cantwell, M. Dicks, B. Fredericks, A. Krall, K.E. Rollins, R. Sullivan, A. Valdez, B. Verhaaren, J. Vieira, L. Walston, E.A. Zvolanek. 2016. *San Luis Valley - Taos Plateau Landscape-Level Cultural Heritage Values and Risk Assessment – Final Report.* ANL/EVS-16/8. Environmental Science Division, Argonne National Laboratory, Argonne Illinois; Bureau of Land Management, San Luis Valley Field Office, Monte Vista, Colorado and Taos Field Office, New Mexico; U.S. Forest Service, Rio Grande National Forest, Colorado; University of New Mexico, Albuquerque, New Mexico. Prepared for U.S. Department of the Interior, Bureau of Land Management, Colorado State Office and New Mexico State Office.

White House, Office of the Press Secretary. 2013. Presidential Proclamation -- Río Grande del Norte National Monument, March 25. Available at: http://www.whitehouse.gov/the-press-office/2013/03/25/presidential-proclamation-r-o-grande-del-norte-national-monument.

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APPENDIX D

BASELINE DATA FOR THE SOLAR REGIONAL MITIGATION STRATEGY

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APPENDIX D: BASELINE DATA FOR THE SOLAR REGIONAL MITIGATION STRATEGY

Description/Title	Author/ Source	Year	Resource Discipline(s)	URL (if available)
(Note: For best results copy and paste links into browser rather than clicking on them)				
NEPA Documents				
Solar PEIS	BLM	2012	Renewable Energy, All	http://blmsolar.anl.gov/program/
Solar PEIS – Solar Energy Zone Sections and Updates	BLM	2012	Renewable Energy, All	http://blmsolar.anl.gov/sez/
San Luis Valley Geothermal Leasing EA-RMP Amendment	BLM	2012	Renewable Energy, All	http://www.blm.gov/co/st/en/fo/slvfo/Geothermal_Leasing.html
Vegetation Treatment PEIS	BLM	2007	Vegetation	http://www.blm.gov/wo/st/en/prog/more/veg_eis.html
South San Luis Lakes Wetland Restoration - EA	BLM	2009	Wetlands, All	http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/slvplc/Upload_Files.Par.51774.File.dat/SSL_Final_EA.pdf
San Luis Valley Field Office Travel Management Plan EA-RMP Amendment	BLM	2013	Recreation, All	http://www.blm.gov/co/st/en/fo/slvfo/Travel_Management.html
San Luis Valley Fire Management Plan - EA	BLM	2004	Fire	http://www.blm.gov/co/st/en/fo/slvfo/fmp.html
Final General Management Plan/Wilderness Study/EIS	NPS	2007	All	http://parkplanning.nps.gov/document.cfm?parkID=67&projectID=11015&documentID=19561
San Luis Valley Regional Habitat Conservation Plan - EA	USFWS	2012	Wildlife, All	http://www.fws.gov/coloradoES/SLV-HCP.html
Biological Opinions, Biological Surveys, Conservation Reviews				
BO for BLM Solar PEIS	BLM / USFWS	2012	Ecology	http://solareis.anl.gov/documents/docs/SolarPEIS_Biological_Opinion.pdf
BO for Genesis Solar Energy (Riverside, CA)	BLM / USFWS	2010	Ecology	http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/palmsprings/genesis.Par.62210.File.dat/GSEP%20Appendix%204.pdf
Southern San Luis Valley Pronghorn Herd Data Analysis Unit PH-16 Game Management Units 80,81,83	Colorado Parks and Wildlife	2008	Ecology, Terrestrial Wildlife	http://cpw.state.co.us/Documents/Hunting/BigGame/DAU/Pronghorn/PH16DAUPlan_SouthernSanLuisValley.pdf
Northern San Luis Valley Pronghorn Herd Data Analysis Unit PH-14 Game Management Units 68, 79, 82, 681, 682, and 791 - March 2008	Colorado Parks and Wildlife	2008	Ecology, Terrestrial Wildlife	http://cpw.state.co.us/Documents/Hunting/BigGame/DAU/Pronghorn/PH14DAUPlan_NorthernSanLuisValley.pdf

Description/Title	Author/ Source	Year	Resource Discipline(s)	URL (if available)
(Note: For best results copy and paste links into browser rather than clicking on them)				
Demographics, Temporal, Spatial Dynamics and Resource Conflict Evaluation of Elk Wintering Near San Antonio Mountain in North Central New Mexico	New Mexico Department of Game & Fish; New Mexico Cooperatie Fish and Wildlife Research Unit	2003	Ecology, Terrestrial Wildlife	http://www.wildlife.state.nm.us/publications/documents/SAMElkProject.pdf
Assessment of Gunnison Prairie Dog and Burrowing Owl Populations on San Luis Valley Solar Energy Zones Proposed Areas	BLM	2011	Terrestrial Wildlife	http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/slvplc/slv_solar.Par.36424.File.dat/Final_Report_Assessment_of_GuPD_Solar_Energy_Fields_2011.pdf
Assessment of San Luis Valley Solar Energy Zones: Gunnison's Prairie Dogs, Burrowing Owls, Raptors, Herpetofauna	San Luis Valley Public Lands Center	2012	Terrestrial Wildlife	http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/slvplc/slv_solar.Par.65880.File.dat/Wildlife%20Assessment%20-%20SLV%20BLM%20Solar%20Energy%20Zones%20-%202012.pdf
San Luis Valley Habitat Partnership Program - Habitat Management Plan	Colorado Wildlife Commission	2010	Ecology, Terrestrial Wildlife	http://cpw.state.co.us/Documents/LandWater/PrivateLandPrograms/HPP/SLValleyApprovedPlan.pdf
2011 Colorado Bat Monitoring - 5 Locations San Luis Valley Bureau of Land Management	BLM, Klamath Wildlife Resources	2011	Bats, Ecology	
Front Range District Bat Surveys of Solar Energy Zones within the San Luis Valley, Colorado	BLM	2011	Bats, Ecology	http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/slvplc/slv_solar.Par.50209.File.dat/FinalReport_FrontRangeBatSurvey.pdf
BLM Solar Energy Zone Hydrology Consulting Services Los Mogotes East Solar Energy Zone Water Resources Inventory Report	E	2013	Hydrology	http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/slvplc/slv_solar.Par.21284.File.dat/LosMogotesSEZ-WaterResourcesReport-Final.pdf
BLM Solar Energy Zone Hydrology Consulting Services De Tilla Gulch Solar Energy Zone Water Resources Inventory Report	Tetra Tech	2014	Hydrology	http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/slvplc/slv_solar.Par.37999.File.dat/DeTillaGulch-SEZ-%20FINAL%20Submittal%20Water%20Resources%20Report.pdf
National Scenic and Historic Trails Strategy and Work Plan	BLM		Cultural, Visual	http://parkplanning.nps.gov/document.cfm?parkID=454&projectID=12591&documentID=14065
San Luis Valley and Central Sangre de Cristo Mountains Reconnaissance Survey Report	National Parks Service	2011		http://parkplanning.nps.gov/document.cfm?parkID=73&projectID=39991&documentID=44749

Description/Title	Author/ Source	Year	Resource Discipline(s)	URL (if available)
(Note: For best results copy and paste links into browser rather than clicking on them)				
Assessment Reports				
Upper Rio Grande Impact Assessment	BOR	2013	Climate Change, Hydrology	http://www.usbr.gov/WaterSMART/wcra/reports/urgia.html
Observed Climate Trends in the Upper Rio Grande Basin	US Army Corps of Engineers	2013	Climate Change, Hydrology	http://www.usbr.gov/WaterSMART/wcra/docs/urgia/URGIAAppxC.pdf
BLM Colorado Plateau Rapid Ecoregional Assessment (REA)	BLM	2012	Ecology, Hydrology	http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas/coloplateau.html
A Conservation Assessment of the Colorado Plateau Ecoregion	TNC	2002	Ecology, Hydrology	http://azconservation.org/downloads/ecoregional_conservation_assessment_reports
Southern Rocky Mountains: An Ecoregional Assessment and Conservation Blueprint	TNC	2001	Ecology, Hydrology	http://azconservation.org/dl/TNCAZ_Ecoregions_Assessment_Southern_Rocky_Mtns.pdf
The Great Sand Dunes Ecosystem Elk and Bison Carrying Capacity Model: Description and Scenario Results	Colorado State University - USGS	2010	Ecology, Wildlife	http://warnercnr.colostate.edu/~rboone/pubs/Wockner_GRSA_grazing_plan_fnlrpt.pdf
Ph.D Dissertation Ecology of Bison, Elk, and Vegetation in an Arid Ecosystem	K.A. Schoenecker - Colorado State University	2012	Ecology, Wildlife	http://digitool.library.colostate.edu///exlibris/dtl/d3_1/apache_media/L2V4bGlicmlzL2R0bC9kM18xL2FwYWNoZV9tZWRpYS8xODY1Njk=.pdf
North-Central New Mexico Landscape Assessment Data Atlas	ForestERA, Northern Arizona University	2006	Landscape Ecology	http://www.forestera.nau.edu/docs/Products/NCNMLA/NCNMLADataAtlas.pdf
2005 Progress Report: Elk and Bison Grazing Ecology in the Great Sand Dunes Complex of Lands	USGS	2005	Ecology, Terrestrial Wildlife	https://www.fort.usgs.gov/products/21779
Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation	University of Colorado at Boulder	2008	Climate Change, Hydrology	http://cwcb.state.co.us/environment/climate-change/Documents/COClimateReportOnePager.pdf
Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation	University of Colorado at Boulder	2014	Climate Change, Hydrology	http://cwcb.state.co.us/environment/climate-change/Pages/main.aspx

Description/Title	Author/ Source	Year	Resource Discipline(s)	URL (if available)
(Note: For best results copy and paste links into browser rather than clicking on them)				
Projecting Climate Effects on Birds and Reptiles of the Southwestern United States	USGS	2014	Climate Change, Ecology	http://pubs.usgs.gov/of/2014/1050/
Guide To Evaluating Visual Impact Assessments for Renewable Energy Projects	NPS/Argonne	2014	Visual	https://irma.nps.gov/App/Reference/Profile/2214258
Summary of Night Skies Data Collection for Great Sand Dunes NP&P October 15-16, 2012	NPS	2012	Visual	
Health Environment Launch Project	EPA	2014	Air, Water, and Soil quality	http://www.cccwater.org/images/HELP_Report.pdf
Other Planning Documents, Studies, Tools, Data, Policy - General				
West-wide Jumpstart Air Quality Modeling Study (WestJumpAQMS)	Western Governor's Association - Western Regional Air Partnership	2014	Air, PM, O3	http://www.wrapair2.org/WestJumpAQMS.aspx
Colorado Dust-on-Snow Program (CODOS)	Center for Snow & Avalanche Studies	2014	Air-PM-Dust-Hydrology	http://www.codos.org/#codos
Taos Resource Management Plan	BLM	2012	All	http://www.blm.gov/nm/st/en/fo/Taos_Field_Office/Taos_Planing/taos_rmp.html
San Luis Resource Area Resource Management Plan	BLM	1991	All	http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp/archived/san_luis.html
Colorado Wildlife Action Plan	Colorado Parks and Wildlife	2006	Ecology, Wildlife	http://cpw.state.co.us/aboutus/Pages/StateWildlifeActionPlan.aspx
Mountains to Plains Energy by Design Report to the Colorado State Lands Board	TNC	2013	Ecology, Wildlife, T&E, Energy	http://www.conservationgateway.org/Files/Pages/m2penergybydesign.aspx
Strategic Plan for Migratory Birds	BLM	2013	Ecology, Migratory Birds	http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2013/IM_2013-119.html

Description/Title	Author/ Source	Year	Resource Discipline(s)	URL (if available)
(Note: For best results copy and paste links into browser rather than clicking on them)				
CoMap Colorado Ownership, Management, and Protection	Colorado State University	2011	Protected Areas	http://www.colorado.edu/AmStudies/lewis/west/cololandmap.pdf
Projecting Climate Effects on Birds and Reptiles of the Southwestern United States	USGS	2014	Climate Change, Ecology	http://pubs.usgs.gov/of/2014/1050/
EPA Air Data	EPA		Air Quality	http://www.epa.gov/airdata/ad_data_daily.html
PRISM Climate Group, Northwest Alliance for Computational Science and Engineering	Oregon State University		Climate Change	http://www.prism.oregonstate.edu/
Natural Resources Conservation Service (NRCS)	USDA		Soil, Snow Levels	http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm
NRCS Snow Telemetry (SNOTEL) data and products	USDA NRCS		Snow levels	http://www.wcc.nrcs.usda.gov/snow/
Western Governor's Association Crucial Habitat Assessment Tool (CHAT)	Western Governor's Association	2014	Wildlife	http://westgovchat.org/data#
Great Sand Dunes National Park and Preserve	NPS			http://parkplanning.nps.gov/parkHome.cfm?parkID=67
Land Fire Vegetation Departure (VDEP)	USGS		Vegetation	http://www.landfire.gov/NationalProductDescriptions11.php

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APPENDIX E

BLM SCREENING OF CANDIDATE REGIONAL MITIGATION SITES FOR THE COLORADO SOLAR ENERGY ZONES

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Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
SITE CHARACTERISTICS						
1. Total area of site (acres)	9,712/8,500	2,650/2,600	93,912	135,184	122,473	39,532
BLM Developable acres (PEIS/Recommended)	9,712	2,650	76,066	102,782	88,666	30,548
Private acres			4,535	20,068	8,802	6,632
County Lands				12,334	25,005	
Local Government						
State Trust acres			13,213			2,352
Forest Service (FS)			98			
State Park Lands						
State Wildlife Areas						
NPS						
FWS						
Tribal Lands						
2. Sources of data for the site.	Solar PEIS	Solar PEIS	LANDFIRE, CNHP, CPW, Nature Serve	Landscape Assessment data, Aerial imagery, LANDFIRE, CNHP, CPW, Nature Serve	Landscape Assessment data, Aerial imagery, LANDFIRE, CNHP, CPW, Nature Serve	LANDFIRE, CNHP, CPW, Nature Serve
3. Mitigates for all or most identified residual impacts that warrant compensatory mitigation?	Resources for Mitigation: terrestrial wildlife habitat, inter-mountain basins semi-desert shrub steppe, winterfat, shortgrass, migratory birds and raptors, special status species, EJ, hydrology, soils, visual resources	Resources for Mitigation: terrestrial wildlife habitat, inter-mountain basins semi-desert shrub steppe, winterfat, shortgrass, migratory birds and raptors, special status species, EJ, hydrology, soils, visual resources	√ Ecological Resources	√ Big game, pronghorn, Gunnison prairie dog-burrowing owl-swift fox, wildlife corridor, connectivity, pollinators, visual, raptors, mtn. plover, swift fox, eligible and potentially eligible cultural features, shorebirds/waterbirds, hydrology, soils, SSS	√ Big game, pronghorn, Gunnison prairie dog-burrowing owl-swift fox, wildlife corridor, connectivity, pollinators, visual, raptors, mtn. plover, swift fox, eligible and potentially eligible cultural features, shorebirds/waterbirds, hydrology, soils, SSS	√ Ecological Resources

[39] Candidate site name and priority of candidate site by SEZ as determined from Spatial Site Narrowing Exercise.

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
4. Mitigation tool (restoration/enhancement, acquisition, banking, withdrawal, special designation, etc.)			LUP Planning Designations, Acquisition, Habitat enhancement	Action 1. Travel and transportation plan completion and implementation activities (pronghorn habitat-seasonal closure & conservation measure enforcement) Action 2. Shrubland - grassland vegetation pollinator restoration/habitat enhancement activities. Action 3. Conservation easement and/or acquisition of non-federal wildlife and playa wetlands habitat. Action 4. Playa wetland restoration. Action 5. Fencing to create reserve common allotments. Action 6. Fencing removal &/or modification (Wildlife friendly fencing). Action 7. Raptor friendly transmission mitigation fund. Action 8. Establish Rio Grande minimum in-stream flows.	Action 1. Pronghorn habitat - seasonal closure & and conservation measure enforcement (hiding) Action 2. Conservation easement and/or acquisition of non-federal wildlife and playa wetlands habitat. Action 3. Playa wetland restoration. Action 4. Shrubland - grassland vegetation - pollinator restoration/habitat enhancement activities. Action 5. Fencing removal &/or modification (Wildlife friendly fencing). Action 6. Raptor friendly transmission mitigation fund. Action 7. Establish Rio Grande minimum in-stream flows.	LUP Planning Designations, Acquisition, Habitat enhancement
5. Site and its proposed actions meet regional conservation/ mitigation goals, objectives, and desired outcomes? √ for Yes (1 point), X for No (-2 points)			√	√	√	√
Justification:			See Table 2.9	See Table 2.9	See Table 2.9	See Table 2.9

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
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6. Consistent with the Resource Management Plan? √ for Yes (1 point), X for No (-2 points); Include justification:	Yes - RMP amended by PEIS ROD	Yes - RMP amended by PEIS ROD	√	√ Taos RMP; Monument designation, Rio Grande Corridor Plan, LWCF	√ Taos RMP; Monument designation, Rio Grande Corridor Plan, LWCF	√
7. Same HUC 4 watershed? Specify watershed.	Rio Grande headwaters	Rio Grande headwaters	Rio Grande headwaters and Rio Grande – Elephant Butte	Rio Grande headwaters and Rio Grande – Elephant Butte	Rio Grande headwaters and Rio Grande – Elephant Butte	Rio Grande headwaters and Rio Grande – Elephant Butte
8. VRM and VRI Class	VRM III: 1,383.1 acres; VRM IV: 7,465 acres; VRI II: 136.9 acres; VRI III: 5,746.1 acres; VRI IV: 3,844.6 acres	VRM III: 2,650.0 acres; VRI III: 2,650.0 acres	VRM I: 9,666.7 acres VRM II: 66,384.9 acres VRM III: 3.5 acres VRI I: 6,518.3 acres VRI II: 1,557.6 acres VRI III: 40,324.3 acres VRI IV: 27,683.3 acres	VRM I: 11,338.3 acres VRM II: 91,235.0 acres VRM III: 346.6 acres VRI I: 11,586.1 acres VRI II: 16,155.9 acres VRI III: 49,998.2 acres VRI IV: 25,104.7 acres	VRM I: 28.9 acres VRM II: 87,643.9 acres VRI I: 50.0 acres VRI III: 59,735.3 acres VRI IV: 27,906.3 acres	VRM III: 31,116.1 acres VRM IV: 6,281.6 acres VRI II: 9,664.0 acres VRI III: 14,406.2 acres VRI IV: 6,116.8 acres
9. Similar landscape value, ecological functionality, biological value, species, habitat types, and/or natural features? Score based on responses to criteria 9a and 9b. √ for Yes (1 point), X for No (-2).			√	√ for Antonito SE SEZ; √ for northern portion of Site only for Los Mogotes SEZ	√	√
9a. Current landscape intactness score? (Using Landscape Assessment) and acres associated with each condition category[40].	High: 7,389; Mod High: 1,616; Mod Low: 519; Low: 188	Mod High: 518; Mod Low: 511; Low: 34	Very High: 687; High: 77,931; Mod High: 10,469; Mod Low: 2,928; Low: 1,924	Very High: 967; High: 91,668; Mod High: 34,212; Mod Low: 5,908; Low: 2,517	High: 99,016; Mod High: 16,099; Mod Low: 1,479; Low: 832	Very High: 314; High: 27,435; Mod High: 9,225; Mod Low: 2,546

[40] Landscape condition categories

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
9b. Dominant vegetation communities (based on LANDFIRE Existing Vegetation data)	Inter-Mountain Basins Semi-Desert Shrub Steppe (45%); Inter-Mountain Basins Mixed Salt Desert Scrub (43%) Inter-Mountain Basins Greasewood Flat (7%)	Inter-Mountain Basins Semi-Desert Shrub Steppe (73%) Inter-Mountain Basins Mixed Salt Desert Scrub (21%); Inter-Mountain Basins Greasewood Flat (4%)	Inter-Mountain Basins Semi-Desert Shrub-Steppe (55%) Inter-Mountain Basins Mixed Salt Desert Scrub (13%) Inter-Mountain Basins Greasewood Flat (10%)	Inter-Mountain Basins Big Sagebrush Shrubland (36%) Colorado Plateau Pinyon-Juniper Woodland (25%) Inter-Mountain Basins Mixed Salt Desert Scrub (9%)	Inter-Mountain Basins Mixed Salt Desert Scrub (47%) Inter-Mountain Basins Semi-Desert Shrub-Steppe (22%) Inter-Mountain Basins Big Sagebrush Shrubland (18%)	Inter-Mountain Basins Semi-Desert Shrub-Steppe (25%) Inter-Mountain Basins Mixed Salt Desert Scrub (12%) Inter-Mountain Basins Big Sagebrush Shrubland (11%)
10. In SEZ Ecoregion? Specify ecoregion. √ for Yes (1 point), X for No (-2 points).	San Luis Valley - Taos Plateau	San Luis Valley - Taos Plateau	√	√	√	√
11. In SEZ ecological subregion? √ for Yes (1 point), X for No (-2 points).	San Luis Alluvial Flats and Wetlands , San Luis Shrublands and Hills	San Luis Alluvial Flats and Wetlands	√ Foothill Shrublands, San Luis Alluvial Flats and Wetlands , San Luis Shrublands and Hills, Taos Plateau	√ Foothill Shrublands, San Luis Shrublands and Hills, Taos Plateau, Volcanic Mid-Elevation Forests	√ San Luis Shrublands and Hills, Taos Plateau	√ San Luis Alluvial Flats and Wetlands , San Luis Shrublands and Hills
12. Provides adequate geographic extent? Depending on whether site provides area for mitigation at least as large as the entire developable area of the SEZ. √ for Yes (1 point), X for No (-2 points).	9,712 acres	2,650 acres	√	√	√	√
13. Site is within or intersects a CPW site? √ for Yes (1 point), X for No (0 points).			X	X	X	X
FEASIBILITY						
14. Feasibility of action? Score 1-5.			5	4	5	4

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
BLM Justification of feasibility score: Scores for 14a through 14e were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions. Where information was not provided by stakeholders, BLM used best available information to score.			5 on average compared with 8 sites based Monument designations and protections; Significant overlap with Taos Plateau Pronghorn Assemblage. Travel management plan = 2; Restoration = 4; on average; current 2016 LWCF funds uncertain/land acquisition funds but willing sellers = 2; conservation easements = 4; all other activities contingent on acquisition of easement, common reserve = uncertain	4 on average compared with 8 sites based Monument designations and protections; Some land ownership challenges; Travel management plan = 2; Restoration = 4; on average; current 2016 LWCF funds uncertain/land acquisition funds but willing sellers = 2; conservation easements = 4; all other activities contingent on acquisition of easement, common reserve = uncertain	5 on average compared with 8 sites based Monument designations and protections; Travel management plan = 2; Restoration = 4; on average; current 2016 LWCF funds uncertain/land acquisition funds but willing sellers = 2; conservation easements = 4; all other activities contingent on acquisition of easement, common reserve = uncertain	BLM management decisions: the upcoming San Luis Valley RMP revision provides an existing opportunity to implement the mitigation; a stand-alone RMP amendment could also be used to implement the mitigation. Some potential stakeholder challenges with new land use designations for protections
14a. What level of documentation is available to demonstrate effectiveness of mitigation action? Use scale of 1 (little to no documentation) to 5 (well-documented).			2	2	2	2
Justification:			Average documentation available	Average documentation available	Average documentation available	Average documentation available

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
14b[41]. Based on action required (e.g., restoration, BLM land management action, land acquisition, Congressional action), how difficult will implementation be? Use scale of 1 (difficult) to 5 (relatively easy).			3	3	3	4
Justification:			3 on average; Travel management plan = 2; Restoration = 4; current 2016 Land & Water Conservation Funds (LWCF) uncertain/land acquisition funds but willing sellers = 2; conservation easements = 4; all other activities contingent on acquisition of easement; 3 common reserve = uncertain	3 on average; Travel management plan = 2; Restoration = 4; on average; current 2016 LWCF funds uncertain/land acquisition funds but willing sellers = 2; conservation easements = 4; all other activities contingent on acquisition of easement, common reserve = uncertain	3 on average; Travel management plan = 2; Restoration = 4; current 2016 Land & Water Conservation Funds (LWCF) uncertain/land acquisition funds but willing sellers = 2; conservation easements = 4; all other activities contingent on acquisition of easement; 3 common reserve = uncertain	BLM management decisions: the upcoming San Luis Valley RMP revision provides an existing opportunity to implement the mitigation; a stand-alone RMP amendment could also be used to implement the mitigation.
14c. Time frame needed to establish site as mitigation location (estimated years)			2 to 5 years Monument Designated	2 to 5 years Monument Designated	2 to 5 years Monument Designated	2-8 years Rio Grande Natural Area in place; Protections under planning (2015)

[41] Rate the mitigation action for difficulty of implementation (not necessarily taking into account the success rate or effectiveness - see above for score based on documentation), based on the following scale: restoration/enhancement actions (score of 5, relatively easy); BLM planning decisions (score of 3-4, less easy to moderately complicated); land acquisition actions (score 1-3, not very easy to moderately complicated); Congressional actions (score of 1, not very easy). Ratings should be adjusted on the basis of factors such as cost of the action; time and effort requirements; public and/or BLM support for or opposition to action; and, for land acquisitions, willingness of seller.

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
14d. Time frame for achieving mitigation goals and objectives from implementation (estimated years)			1-2 years wildlife friendly fencing; 3-5 years land acquisitions; 5 to 10 years, restoration projects	3-5 years land acquisitions; 5 to 10 years; restoration projects	1-2 years wildlife friendly fencing; 3-5 years land acquisitions; 5 to 10 years, restoration projects	1-2 years wildlife friendly fencing; 3-5 years land acquisitions; 5 to 10 years, restoration projects
14e. Cost estimate (2015 $)			~$1-$8 million/land acquisition; ~$350k Travel Management planning; ~$20-30/acre/year monitoring, BLM NEPA cost for mitigation actions ~$50K, ~$3 -5K for water catchment maintenance/unit (labor/materials), ~$15-25K for wildlife friendly fencing for forage banks (i.e. full section/640 acres = 4 linear miles at ~$60K to 100K for 1 section forage bank)	~$1-$8 million/land acquisition; ~$350k Travel Management planning; ~$20-30/acre/year monitoring, BLM NEPA cost for mitigation actions ~$50K, ~$3 -5K for water catchment maintenance/unit (labor/materials), ~$15-25K for wildlife friendly fencing for forage banks (i.e. full section/640 acres = 4 linear miles at ~$60K to 100K for 1 section forage bank)	~$1-$8 million/land acquisition; ~$350k Travel Management planning; ~$20-30/acre/year monitoring, BLM NEPA cost for mitigation actions ~$50K, ~$3 -5K for water catchment maintenance/unit (labor/materials), ~$15-25K for wildlife friendly fencing for forage banks (i.e. full section/640 acres = 4 linear miles at ~$60K to 100K for 1 section forage bank)	~$1-$8 million/land acquisition; ~$350k Travel Management planning; ~$20-30/acre/year monitoring, BLM NEPA cost for mitigation actions ~$50K, ~$3 -5K for water catchment maintenance/unit (labor/materials), ~$15-25K for wildlife friendly fencing for forage banks (i.e. full section/640 acres = 4 linear miles at ~$60K to 100K for 1 section forage bank)
EFFECTIVENESS / ADDITIONALITY						
15. Effectiveness and Additionality Score 1-5.			4	3	4	5

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	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
Justification of effectiveness and additionality score: Scores for 15a through 15c were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.			Effectiveness high due to fewer potential land use conflicts. Monument designation and presence of Pronghorn/big game, golden eagle, Gunnison's Prairie dog, burrowing owl, swift fox, migratory birds/wetland dependent species, soils & hydrology, rec opportunities (bird watch/camping), air & water maintenance; some pronghorn habitat/water resources; visuals; EJ. Additional in terms of potential LWCF acquisitions.	Effectiveness challenges due to some adjacent mining and other land use challenges. Monument designation benefit and presence of Pronghorn/big game, golden eagle, Gunnison's Prairie dog, burrowing owl, swift fox, migratory birds/wetland dependent species, soils & hydrology, rec opportunities (bird watch/camping), air & water maintenance; some pronghorn habitat/water resources; visuals; EJ. Additional in terms of potential LWCF acquisitions.	Effectiveness high due to fewer potential land use conflicts. Monument designation and presence of Pronghorn/big game, golden eagle, Gunnison's Prairie dog, burrowing owl, swift fox, migratory birds/wetland dependent species, soils & hydrology, rec opportunities (bird watch/camping), air & water maintenance; some pronghorn habitat/water resources; visuals; EJ. Additional in terms of potential LWCF acquisitions.	High for additionality with added land use protection designations (i.e. ACEC). Varied possible mitigation actions could be very effective. Low adjacent land use conflicts.
15a[42]. To what extent can the full spectrum of mitigation desired outcomes be met simultaneously? Use scale of 0 (low) to 5 (high).			4	4	4	5

[42] Rate the extent to which the mitigation desired outcomes can be met simultaneously through mitigation actions at the site, based on the following scale: all (100%) of the desired outcomes can be met (score of 5); 75-99% can be met (score of 4); 50-75% (score of 3); 25 - 49% can be met (score of 2); less than 25% can be met (score of 1); none of the desired outcomes can be met (score of 0).

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
Justification:			Pronghorn/big game, golden eagle, Gunnison's Prairie dog, Burrowing owl, swift fox, migratory birds/wetland dependent species, boils & hydrology, rec opportunities (bird watch/camping), air & water maintenance; some pronghorn habitat/water resources; visuals; EJ	Pronghorn/big game, golden eagle, Gunnison's Prairie dog, burrowing owl, swift fox, migratory birds/wetland dependent species, soils & hydrology, rec opportunities (bird watch/camping), air & water maintenance; some pronghorn habitat/water resources; visuals; EJ	Pronghorn/big game, golden eagle, Gunnison's Prairie dog, Burrowing owl, swift fox, migratory birds/wetland dependent species, boils & hydrology, rec opportunities (bird watch/camping), air & water maintenance; some pronghorn habitat/water resources; visuals; EJ	Protection, preservation, goals/ overlap Pronghorn/big game, golden eagle, Gunnison's Prairie dog, Burrowing owl, swift fox, migratory birds/wetland dependent species, boils & hydrology, rec opportunities (bird watch/camping), air & water maintenance; some pronghorn habitat/water resources; visuals; EJ
15b[43]. How effective will the mitigation be in the context of achieving mitigation goals/objectives for conserving/restoring ecosystem intactness? Use scale of 1 (low) to 5 (high).			5	5	5	5

[43] Rate the effectiveness of the mitigation actions at the site in terms of achieving mitigation goals/objectives, based on the following scale: highly effective (score of 5); moderately effective (scores of 2-4), and minimally effective (score of 1).

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
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Justification:			Replacing terrestrial habitat loss (pronghorn/big game, sensitive species),	Replacing terrestrial habitat loss (pronghorn/big game, SSS), provide common reserve allotment for grazing loss.	Replacing terrestrial habitat loss (pronghorn/big game, sensitive species), provide common reserve allotment for grazing loss.	Replacing terrestrial habitat loss (pronghorn/big game, sensitive species),
15c. Mitigation consists of actions that would not otherwise be undertaken by BLM.			√ Uncertainty in federal funds for land acquisition funding	√ Uncertainty in federal funds for land acquisition funding	√ Uncertainty in federal funds for land acquisition funding	√ Uncertainty in federal funds for land acquisition funding
RISK						
16. Risk of action(s)? Score 1-5.			3	2	3	5
Justification of risk score: Scores for 16a through 16b were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.			Hunting-access-road use; willing sellers for land acquisition; climate change models show higher temp. & lower precipitation (drought) in this portion of study area. Private Inholdings - Wildlife Urban Interface I - National	Hunting-access-road use; willing sellers for land acquisition; a climate change models show higher temp. & lower precipitation (drought) in this portion of study area. Adjacent property owners - land users - Private Inholdings - Wildlife Urban Interface - National	Hunting-access-road use; willing sellers for land acquisition; climate change models show higher temp. & lower precipitation (drought) in this portion of study area. Private Inholdings - Wildlife Urban Interface I - National	All BLM jurisdictions. Assuming social acceptance in Conejos County and affected grazing permittees for expanded ACEC area designated for pronghorn and SSS protections
16a. What are the constraints or threats to success?			Hunting-access-road use; willing sellers for land acquisition; climate change models show higher temp. & lower precipitation (drought) in this portion of study area.	Hunting-access-road use; willing sellers for land acquisition; a climate change models show higher temp. & lower precipitation (drought) in this portion of study area.	Hunting-access-road use; willing sellers for land acquisition; climate change models show higher temp. & lower precipitation (drought) in this portion of study area.	Hunting-access-road use; willing sellers for land acquisition; climate change models show higher temp. & lower precipitation (drought) in this portion of study area.

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
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16b. To what extent will surrounding land uses impact mitigation success (e.g., proximity to expanding urban areas, pressures on region for recreational land use, excessive groundwater withdrawal and drawdown intactnesss that could affect resources on the mitigation site)?			Private Inholdings - Wildlife Urban Interface I	Adjacent property owners - land users - Private Inholdings - Wildlife Urban Interface	Private Inholdings - Wildlife Urban Interface I -	Adjacent property owners - land users - Private Inholdings
DURABILITY						
17. Durability of action(s)? Score 1-5.			4	5	4	3
Justification of durability score: Scores for 17a through 17b were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.			Monument designation creates high durability. Moderate potential climate change on 79% of site	Monument. Moderate potential climate change on 55% of site. Lowest potential among sites compared.	Monument designation creates high durability. Moderate potential climate change on 79% of site	Rio Grande Natural Area designations create high durability along river. Opportunity for additional designation protections. High potential climate change on 79% of site.
17a[44]. How durable would the mitigation be from a timeframe and management perspective? Use scale of 1 (low) to 5 (high).			5	5	5	4
Justification:			Monument	Monument	Monument	Rio Grande Natural Area

[44] Rate the temporal and managerial durability of the mitigation action, based on the following scale: Congressionally protected lands would be very durable (score of 5); other federally administered lands specifically designated in land use plans or withdrawn by public land order would be moderately to very durable (score of 4-5); federally administered lands without any special designation but with enforcement oversight would have limited durability (score of 2-3); lands without special designation or enforcement oversight would not be very durable (score of 1).

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
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17b. Are there potential effects of future climate change? (% of area with high or moderate potential for climate change – from LA model)	High (99%)	High (66%)	Moderate (63%)	Moderate (55%)	Moderate (79%)	High (48%)
PRELIMINARY SCORING: Calculate score by summing the entries in blue shaded cells. Scores are calculated based on entries in blue shaded cells as follows: all scaled values (i.e. ratings from 1 to 5) are summed, 1 point is added for each √.			23	21	23	24
ADDITIONAL CONSIDERATIONS						
18. Presence of unique/valuable resources or features? BLM scored 1 to 3 based on best professional judgment of resources listed in 18a-18g; most valuable resources are in BOLD.			3	3	3	3
18a. Perennial, protected sources of water?	Alta Lake	none	Rio Grande River	Rio Grande River	Rio Grande River	Rio Grande River
18b. Unique species assemblages?	Grassland fauna assemblage, big game seasonal habitat	Grassland fauna assemblage, big game seasonal habitat	Ferruginous hawk; mtn plover, burrowing owl, Gunnison's Prairie Dog, swift fox, river otter	Ferruginous hawk; mtn plover, burrowing owl, Gunnison's Prairie Dog, swift fox, river otter, Yuma skipper, pinyon juniper jay	Ferruginous hawk; mtn plover, burrowing owl, Gunnison's Prairie Dog, swift fox, river otter	Ferruginous hawk; mtn plover, burrowing owl, Gunnison's Prairie Dog, swift fox, river otter

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
18c. Protected species and/or critical habitat?	ESA-listed species: southwestern willow flycatcher (no designated critical habitat); BLM-sensitive species: Ripley's milkvetch, rock-loving aletes, Gunnison's prairie dog, mountain plover, western burrowing owl, big free-tailed bat, swift fox, ferruginous hawk.	ESA-listed species: none (no designated critical habitat); BLM-sensitive species: mountain plover, western burrowing owl, Gunnison's prairie dog.	Gunnison's prairie dog - montane population	ESA critical habitat for Southwest Willow flycatcher, likely yellow billed cuckoo; eagles; Rio Grande Chub & Sucker BLM sensitive species (swift fox, mtn plover, burrowing owl, migratory birds, Gunnison Prairie dog);	ESA critical habitat for Southwest willow flycatcher, likely yellow billed cuckoo; eagles; Rio Grande Chub & Sucker BLM sensitive species: swift fox, mtn plover, burrowing owl, migratory birds, Gunnison Prairie dog);	ESA critical habitat for Southwest willow flycatcher, likely yellow billed cuckoo; eagles; Rio Grande Chub & Sucker BLM sensitive species: swift fox, mtn plover, burrowing owl, migratory birds, Gunnison Prairie dog);
18d. Desert washes or ephemeral drainages?	Ephemeral drainages	Ephemeral drainages	Intermittent streams	Ephemeral playas	Numerous ephemeral playas	Intermittent streams
18e. Known highly significant and unique cultural resources.	Cumbres and Toltec Scenic Railroad; West Fork of the North Branch of the Old Spanish Trail segment under study; Picuris Trail; Chili Line; Sangre de Cristo NHA	West Fork of the North Branch of the Old Spanish Trail segment under study; Sangre de Cristo NHA	Yes, Close to West Fork Old Spanish Trail	Yes, Close to West Fork Old Spanish Trail	Yes, Close to West Fork Old Spanish Trail	Includes DeVrgas Trails (1693), potentially DeAnza trails (1787)

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[39]			
	Antonito South East	Los Mogotes East	Antonito SE Area 3 (TNC) Antonito SE – 1, Los Mogotes - 2	Taos Plateau Big Game Migration (BLM) Antonito SE – 2 Los Mogotes – 1	Taos Plateau Pronghorn Assemblage (BLM) Antonito SE - 3	Antonito SE Area 2 (TNC) Antonito SE - 4
18f. Other?			Provides pronghorn assemblage habitat; mule deer migration corridor & winter range; raptor foraging habitat - migratory bird Pinyon Jay-Sage obligates; sagebrush pollinator communication	Provides winter range, big game hiding and thermal cover habitat; raptor foraging habitat - migratory bird Pinyon Jay-Sage obligates; sagebrush pollinator communication	Provides pronghorn assemblage habitat; mule deer migration corridor & winter range; raptor foraging habitat - migratory bird Pinyon Jay-Sage obligates; sagebrush pollinator communication	Provides pronghorn assemblage habitat; mule deer migration corridor & winter range; raptor foraging habitat - migratory bird Pinyon Jay-Sage obligates; sagebrush pollinator communication
19. Links two or more protected areas? √ for Yes (1 point), 0 for No (no score adjustment)			√ Links Rio Grande del Norte National Monument, including Audubon Important Bird Area to the RGNA	√ Links Cumbres Toltec NHL - Rio San Antonio WSA - Rio Grande del Norte National Monument, including Audubon Important Bird Area - RGNA - Northern Rio Grande NHA - Sangre de Cristo NHA - Rio Grande Wild & Scenic River - Urraca State Wildlife Area	√ Links Rio Grande del Norte National Monument, including Audubon Important Bird Area to the RGNA	√ Links Rio Grande del Norte National Monument, including Audubon Important Bird Area to the RGNA
COMBINED SCORE: Calculate score by summing the entries in blue-shaded cells. Scores are calculated based on entries in blue-shaded cells as follows: all scaled values (i.e., ratings from 1 to 5) are summed; 1 pt is added for each check mark (√).	N/A	N/A	27	25	27	28

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
Site Characteristics					
1. Total area of site (acres)	9,712/8,500	2,650/2,600	378,599 (CO) 393,985 (NM)	78,965	25,160
BLM Developable acres (PEIS/Recommended)	9,712	2,650	42,950 (CO) 74,380 (NM)	78,965	25,160
Private acres			315,792 (CO) 138,635 (NM)		
County Lands			7,849 (CO) 5,720 (NM)		
Local Government					
State Trust acres			638 (CO)		
Forest Service (FS)			114,518 (NM)		
State Park Lands			892 (CO)		
State Wildlife Areas			4,209 (CO)		
NPS			3,934 (CO)		
FWS			2,335 (CO)		
Tribal Lands			60,732 (NM)		
2. Sources of data for the site.	Solar PEIS	Solar PEIS	Arnie Valdez	REA data provided by Colorado BLM, San Luis Valley RMP, TWS LWC Inventory	Landscape Assessment data, Aerial imagery, LANDFIRE, CNHP, CPW, Nature Serve
3. Mitigates for all or most identified residual impacts that warrant compensatory mitigation?	Resources for Mitigation: terrestrial wildlife habitat, inter-mountain basins semi-desert shrub steppe, winterfat, shortgrass, migratory birds and raptors, special status species, EJ, hydrology, soils, visual resources	Resources for Mitigation: terrestrial wildlife habitat, inter-mountain basins semi-desert shrub steppe, winterfat, shortgrass, migratory birds and raptors, special status species, EJ, hydrology, soils, visual resources	√ E. Fork Old Spanish Trail, pronghorn, big game migration corridor, connectivity, visual, SSS, raptors, mtn. plover, swift fox, shorebirds, waterbirds	√	√ W. Fork Old Spanish Trail, pronghorn, migration corridor, connectivity, visual, SSS, raptors, mtn plover, swift fox, Hot Creek

[45] Candidate site name and priority of candidate site by SEZ as determined from Spatial Site Narrowing Exercise.

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
4. Mitigation tool (restoration/enhancement, acquisition, banking, withdrawal, special designation, etc.)			Action 1. Establishment of 3rd-party administered cultural heritage area compensation fund Action 2. Map and document Spanish & Mexican era land grant acequia-long lot agricultural Hispano settlement heritage areas in the Sangre de Cristo & Northern Rio Grande NHAs	Special designation/protective management; investment of mitigation funds on management and restoration in protected areas. See TWS comments pp. 7-16 for more details.	Action 1: Create BLM-County partnership to assist with county transfer station development, promote trash clean up events, enforce trash dumping compliance; Clean trash dump sites Action 2. Expand Los Mogotes ACEC during RMP revision prioritizing winterfat -grassland habitat for viable wildlife populations Action 3. Install wildlife friendly fence or remove ineffective and/or unneeded fencing Action 4. Repair &/or remove outdated, or construct new wildlife water sources; Action 5. Augment land use compliance monitoring and enforcement capabilities.
5. Site and its proposed actions meet regional conservation/ mitigation goals, objectives, and desired outcomes? √ for Yes (1 point), X for No (-2 points)			√	√	√
Justification:			See Table 2.9	See Table 2.9	See Table 2.9
6. Consistent with the Resource Management Plan? √ for Yes (1 point), X for No (-2 points); Include justification:	Yes - RMP amended by PEIS ROD	Yes - RMP amended by PEIS ROD	√ Rio Grande Corridor	√	√
7. Same HUC 4 watershed? Specify watershed.	Rio Grande headwaters	Rio Grande headwaters	Rio Grande headwaters and Rio Grande – Elephant Butte	Rio Grande headwaters	Rio Grande headwaters
8. VRM and VRI Class	VRM III: 1,383.1 acres; VRM IV: 7,465 acres; VRI II: 136.9 acres; VRI III: 5,746.1 acres; VRI IV: 3,844.6 acres	VRM III: 2,650.0 acres; VRI III: 2,650.0 acres	VRM II: 19,239.8 acres VRM III: 117,073.2 acres VRM IV: 40,341.6 acres VRI II: 25,270.5 acres VRI III: 13,421.3 acres VRI IV: 2,735.8 acres	VRM II: 4,606.4 acres VRM III: 32,352.6 acres VRM IV: 42,041.1 acres VRI II: 26,359.9 acres VRI III: 29,261.0 acres VRI IV: 21,247.9 acres	VRM III: 9,667.4 acres VRM IV: 15,506.6 acres VRI II: 1,409.1 acres VRI III: 16,669.6 acres VRI IV: 7,083.8 acres

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
9. Similar landscape value, ecological functionality, biological value, species, habitat types, and/or natural features? Score based on responses to criteria 9a and 9b. √ for Yes (1 point), X for No (-2).			√	√	√
9a. Current landscape intactness score? (Using Landscape Assessment) and acres associated with each intactness category[46].	High: 7,389; Mod High: 1,616; Mod Low: 519; Low: 188	Mod High: 518; Mod Low: 511; Low: 34	Very High: 26,546; High: 91,618; Mod High: 62,849; Mod Low: 155,929; Low: 30,240; Very Low: 11,762	Very High: 2,968; High: 65,664; Mod High: 7,316; Mod Low: 2,488; Low: 560; Very Low: 11	High: 21,766; Mod High: 2,175; Mod Low: 971; Low: 250; Very Low: 11
9b. Dominant vegetation communities (based on LANDFIRE Existing Vegetation data)	Inter-Mountain Basins Semi-Desert Shrub Steppe (45%); Inter-Mountain Basins Mixed Salt Desert Scrub (43%) Inter-Mountain Basins Greasewood Flat (7%)	Inter-Mountain Basins Semi-Desert Shrub Steppe (73%) Inter-Mountain Basins Mixed Salt Desert Scrub (21%); Inter-Mountain Basins Greasewood Flat (4%)	Inter-Mountain Basins Big Sagebrush Shrubland (22%) Inter-Mountain Basins Semi-Desert Shrub-Steppe (10%)	Inter-Mountain Basins Semi-Desert Shrub-Steppe (33%) Inter-Mountain Basins Big Sagebrush Shrubland (28%) Inter-Mountain Basins Mixed Salt Desert Scrub (10%)	Inter-Mountain Basins Semi-Desert Shrub-Steppe (73%) Inter-Mountain Basins Mixed Salt Desert Scrub (14%) Inter-Mountain Basins Big Sagebrush Shrubland (6%)
10. In SEZ Ecoregion? Specify ecoregion. √ for Yes (1 point), X for No (-2 points).	San Luis Valley - Taos Plateau	San Luis Valley - Taos Plateau	√	√ Listed in the same EPA Level III Ecoregion (22. Colorado-New Mexico Plateau)	√
11. In SEZ ecological subregion? √ for Yes (1 point), X for No (-2 points).	San Luis Alluvial Flats and Wetlands , San Luis Shrublands and Hills	San Luis Alluvial Flats and Wetlands	√ Crystalline Subalpine Forests, Foothill Shrublands, Salt Flats, San Luis Alluvial Flats and Wetlands, San Luis Shrublands and Hills, Sand Dunes and Sand Sheets, Sedimentary Mid-Elevation Forests	√ Foothill Shrublands, San Luis Alluvial Flats and Wetlands , San Luis Shrublands and Hills, Volcanic Mid-Elevation Forests	√ San Luis Alluvial Flats and Wetlands , San Luis Shrublands and Hills

[46] Landscape condition categories

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
12. Provides adequate geographic extent? Depending on whether site provides area for mitigation at least as large as the entire developable area of the SEZ. √ for Yes (1 point), X for No (-2 points).	9,712 acres	2,650 acres	√	√	√
13. Site is within or intersects a CPW site? √ for Yes (1 point), X for No (0 points).			√	√	√
FEASIBILITY					
14. Feasibility of action? Score 1-5.			5	3	4
BLM Justification of feasibility score: Scores for 14a through 14e were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions. Where information was not provided by stakeholders, BLM used best available information to score.			Assuming cultural resource value mitigation goals and actions and SHPO, NPS, NHA & academic support and engagement. Also some opportunity for illegal dump clean-up; visual, socioeconomic, and dust abatement	BLM management decisions: the upcoming San Luis Valley RMP revision provides an existing opportunity to implement the mitigation; a stand-alone RMP amendment could also be used to implement the mitigation. Some potential stakeholder challenges with extent of new land use designations for protections	BLM management decisions: the upcoming San Luis Valley RMP revision provides an existing opportunity to implement the mitigation; a stand-alone RMP amendment could also be used to implement the mitigation. Some potential stakeholder challenges with new land use designations for protections
14a. What level of documentation is available to demonstrate effectiveness of mitigation action? Use scale of 1 (little to no documentation) to 5 (well-documented).			2	4	2

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
Justification:			See Library of Congress documentation of NM acequia-long lot systems for La Cienega NM (from A.Valdez)	BLM has a long history of using protective management to meet goals and objectives for resources and to support multiple use and sustained yield of the varied resources and values found on public lands. This includes designations such as ACECs and establishment of protective management prescriptions through RMPs.	Average documentation available
14b[47]. Based on action required (e.g., restoration, BLM land management action, land acquisition, Congressional action), how difficult will implementation be? Use scale of 1 (difficult) to 5 (relatively easy).			5	4	3
Justification:			Assuming SHPO, NPS, NHA & academic support and engagement	BLM management decisions: the upcoming San Luis Valley RMP revision provides an existing opportunity to implement the mitigation; a stand-alone RMP amendment could also be used to implement the mitigation.	BLM-NEPA FLPMA land use allocation decision; Some complication defining compatible uses for expanded ACEC values

[47] Rate the mitigation action for difficulty of implementation (not necessarily taking into account the success rate or effectiveness - see above for score based on documentation), based on the following scale: restoration/enhancement actions (score of 5, relatively easy); BLM planning decisions (score of 3-4, less easy to moderately complicated); land acquisition actions (score 1-3, not very easy to moderately complicated); Congressional actions (score of 1, not very easy). Ratings should be adjusted on the basis of factors such as cost of the action; time and effort requirements; public and/or BLM support for or opposition to action; and, for land acquisitions, willingness of seller.

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
14c. Time frame needed to establish site as mitigation location (estimated years)			1 to 3 years	5-8 years Completion of SRMS BLM should ensure integrity of Mitigation Sites in the interim period between completing the SRMS and when SEZ development occurs.	1 to 5 years
14d. Time frame for achieving mitigation goals and objectives from implementation (estimated years)			1 to 5 years	8-10 years Goals and objectives will be supported as soon as BLM establishes protective designations and management of mitigation sites. Investments of mitigation funds on restoration projects in the mitigation sites would take longer.	2 to 10 years
14e. Cost estimate (2015 $)			Consult Arnie Valdez for NM mapping costs	Variable The per-acre SRMS mitigation fee paid by developers could be used to cover BLM's administrative costs for establishing protective designations and management prescriptions, as well as for ongoing management and restoration activities in mitigation sites.	~NEPA-RMP revision costs
EFFECTIVENESS / ADDITIONALITY					
15. Effectiveness and Additionality Score 1-5.			2	4	4

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
Justification of effectiveness and additionality score: Scores for 15a through 15c were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.			2 - Overall; 5 - NHA values - Sangre de Cristo & Northern Rio Grande National Heritage - 1 other resource values & functions.	Very high for additionality with opportunity for expanded ACEC. Some land use change extent challenges. The mitigation sites possess the full range of environmental values and resources that BLM found to warrant compensatory mitigation. This suite of resources broadly support the goals established by the SRMS. We do not have specific information regarding the potential for the mitigation sites to off-set impacts to cultural resources, Native American concerns, socioeconomic issues and EJ issues.	High for additionality with fewer potential land use conflicts. Opportunity for expanded ACEC Pronghorn, elk, mule deer (connectivity corridor), SSS (adjacent habitat protection), migratory birds, visual view (north) soils & hydrology (provides veg cover), EJ (grazing, rec opportunities, air & water maintenance); No: wetland dependent species.
15a[48]. To what extent can the full spectrum of mitigation desired outcomes be met simultaneously? Use scale of 0 (low) to 5 (high).			2	4	3

[48] Rate the extent to which the mitigation desired outcomes can be met simultaneously through mitigation actions at the site, based on the following scale: all (100%) of the desired outcomes can be met (score of 5); 75-99% can be met (score of 4); 50-75% (score of 3); 25 - 49% can be met (score of 2); less than 25% can be met (score of 1); none of the desired outcomes can be met (score of 0).

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
Justification:			2 - Overall; 5 - NHA values - Sangre de Cristo & Northern Rio Grande National Heritage - 1 other resource values & functions	The mitigation sites possess the full range of environmental values and resources that BLM found to warrant compensatory mitigation. This suite of resources broadly support the goals established by the SRMS. We do not have specific information regarding the potential for the mitigation sites to off-set impacts to cultural resources, Native American concerns, socioeconomic issues and EJ issues.	Yes: Pronghorn, elk, mule deer (connectivity corridor), SSS (adjacent habitat protection), migratory birds, visual view (north) soils & hydrology (provides veg cover), EJ (grazing, rec opportunities, air & water maintenance); No: wetland dependent species
15b[49]. How effective will the mitigation be in the context of achieving mitigation goals/objectives for conserving/restoring ecosystem intactness? Use scale of 1 (low) to 5 (high).			3	5	3
Justification:			Mitigation site and action responds to special designated area and NHA cultural heritage values, but not necessarily ecosystem intactness or species conservation goals.	As supported by REA data and Citizen LWC inventories, the sites recommended for mitigation would be highly effective in achieving mitigation goals/objectives for conserving/restoring ecosystem intactness.	ACEC expansion could provide long-term protections for pronghorn, BLM Sensitive Species, upland views to resource values impacted by Los Mogotes SEZ. Additional modification of fences would aid big game movement, water improvement projects would mitigate impacts to migratory birds.

[49] Rate the effectiveness of the mitigation actions at the site in terms of achieving mitigation goals/objectives, based on the following scale: highly effective (score of 5); moderately effective (scores of 2-4), and minimally effective (score of 1).

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
15c. Mitigation consists of actions that would not otherwise be undertaken by BLM.			Non-federal lands	Though BLM has funding for RMP revisions and amendments which could be used to support protection of the proposed mitigation sites, mitigation funds would provide a sure means of collecting the funds necessary to achieve protection of the mitigation sites and a means for investing in restoration and management of the protected mitigation sites.	√ Yes, Unknown or no planned funding for BLM land
RISK					
16. Risk of action(s)? Score 1-5.			1	3	5
Justification of risk score: Scores for 16a through 16b were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.			Assuming understanding of pre-American period land use patterns and cultural landscape characteristics and high private ownership	Higher risk given extent, varied resources, land use interest and conflict. The overall value and quality of mitigation sites could be diminished in the interim without appropriate interim management by BLM.	All BLM jurisdiction. Assuming social acceptance in Conejos County and affected grazing permittees for expanded ACEC area designated for pronghorn and SSS protections
16a. What are the constraints or threats to success?			Understanding of pre-American period land use patterns and cultural landscape characteristics.	The overall value and quality of mitigation sites could be diminished in the interim without appropriate interim management by BLM. BLM should establish interim management to maintain the suitability of the mitigation sites, as detailed on pp. 7-16 of the TWS comments and in Attachment 4.	Social acceptance in Conejos County and affected grazing permittees for expanded ACEC area designated for pronghorn and SSS protections.

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
16b. To what extent will surrounding land uses impact mitigation success (e.g., proximity to expanding urban areas, pressures on region for recreational land use, excessive groundwater withdrawal and drawdown conditions that could affect resources on the mitigation site)?			Rapid land use change alters 150-400 year old subsistence agricultural land cover features,	REA data indicates that area within and surrounding both of the proposed mitigation sites have very low and low human development intensity. Future change models indicate the proposed sites and surrounding areas may see increased development, but noticeably less use as compared to the greater San Luis Valley and Taos Plateau. Surrounding land use is not expected to significantly impact long-term success of proposed mitigation.	SEZ build-out affects visual mitigation success.
DURABILITY					
17. Durability of action(s)? Score 1-5.			5	3	2
Justification of durability score: Scores for 17a through 17b were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.			Assuming academic and student involvement, long-term & permanent knowledge base development.	BLM has a variety of special designations and management actions at its disposal to establish the necessary level of durability to fulfill regional goals and objectives. BLM can add durability by creating overlapping protective designations and committing that if a mitigation site were to lose protective management that the agency would protect another, equivalent site to maintain an equal level of mitigation. Mitigation funds would provide a durable source of funds for management. High potential climate change on 56% of site	BLM has a variety of special designations and management actions at its disposal to establish the necessary level of durability to fulfill regional goals and objectives. BLM can add durability by creating overlapping protective designations and committing that if a mitigation site were to lose protective management that the agency would protect another, equivalent site to maintain an equal level of mitigation. Mitigation funds would provide a durable source of funds for management. High potential climate change on 75% of site

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
17a[50]. How durable would the mitigation be from a timeframe and management perspective? Use scale of 1 (low) to 5 (high).			5	4	4
Justification:			Assuming academic and student involvement, long-term & permanent knowledge base development.	BLM has a variety of special designations and management actions at its disposal to establish the necessary level of durability to fulfill regional goals and objectives. BLM can add durability by creating overlapping protective designations and committing that if a mitigation site were to lose protective management that the agency would protect another, equivalent site to maintain an equal level of mitigation. Mitigation funds would provide a durable source of funds for management.	Assuming secure implementation action funding, for wildlife friendly fencing & water development installation & maintenance.
17b. Are there potential effects of future climate change? (% of area with high or moderate potential for climate change – from LA model)	High (99%)	High (66%)	Moderate (39%)	High (56%)	High (75%)
PRELIMINARY SCORING: Calculate score by summing the entries in blue shaded cells. Scores are calculated based on entries in blue shaded cells as follows: all scaled values (i.e. ratings from 1 to 5) are summed, 1 point is added for each √.	N/A	N/A	21	21	23
ADDITIONAL CONSIDERATIONS					

[50] Rate the temporal and managerial durability of the mitigation action, based on the following scale: Congressionally protected lands would be very durable (score of 5); other federally administered lands specifically designated in land use plans or withdrawn by public land order would be moderately to very durable (score of 4-5); federally administered lands without any special designation but with enforcement oversight would have limited durability (score of 2-3); lands without special designation or enforcement oversight would not be very durable (score of 1).

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
18. Presence of unique/valuable resources or features? BLM scored 1 to 3 based on best professional judgment of resources listed in 18a-18g; most valuable resources are in BOLD.			2	2	2
18a. Perennial, protected sources of water?	Alta Lake	none	Sangres drainages, Artesian Wells/Springs, Big Springs	√	Alamosa River
18b. Unique species assemblages?	Grassland fauna assemblage, big game seasonal habitat	Grassland fauna assemblage, big game seasonal habitat	Shorebirds-waterbirds; Rio Grande corridor ecosystem	We do not have information on this at this time.	
18c. Protected species and/or critical habitat?	ESA-listed species: southwestern willow flycatcher (no designated critical habitat); BLM-sensitive species: Ripley's milkvetch, rock-loving aletes, Gunnison's prairie dog, mountain plover, western burrowing owl, big free-tailed bat, swift fox, ferruginous hawk.	ESA-listed species: none (no designated critical habitat); BLM-sensitive species: mountain plover, western burrowing owl, Gunnison's prairie dog.	BLM sensitive species: swift fox, mtn plover, burrowing owl, migratory birds, Gunnison Prairie dog);	BLM sensitive species: swift fox, mtn plover, burrowing owl, migratory birds, Gunnison Prairie dog);	ESA listed species: Southwest willow flycatcher, Lynx, Yellow-billed cuckoo; ESA occupied habitat present
18d. Desert washes or ephemeral drainages?	Ephemeral drainages	Ephemeral drainages	Desert washes and ephemeral playas	Intermittent and ephemeral streams	Ephemeral drainages; playa wetlands

Criteria	SEZs Being Evaluated		Candidate Sites and SEZ Priority[45]		
	Antonito South East	Los Mogotes East	NHA Hispano Cultural Landscapes – Antonito SE – 5 Los Mogotes - 5	Los Mogotes (TWS) Los Mogotes - 3	Mogote-Conejos (BLM) Los Mogotes - 4
18e. Known highly significant and unique cultural resources.	Cumbres and Toltec Scenic Railroad; West Fork of the North Branch of the Old Spanish Trail segment under study; Picuris Trail; Chili Line; Sangre de Cristo NHA	West Fork of the North Branch of the Old Spanish Trail segment under study; Sangre de Cristo NHA	Yes, Sangre de Cristo NHA & Conservation Area, SWA, E. Fork Old Spanish Trail	Unknown	Sangre de Cristo NHA, SWA, Hot Creek, Cumbres Toltec, W. Fork Old Spanish Trail; Astragalus population area
18f. Other?			Provides pronghorn assemblage habitat; mule deer migration corridor & winter range; raptor foraging habitat - migratory bird Pinyon Jay-Sage obligates; sagebrush pollinator communication	Citizen inventory found LWC in both the Los Mogotes East and Rio Grande Mitigation Sites.	Provides pronghorn assemblage habitat; mule deer migration corridor & winter range; raptor foraging habitat - migratory bird Pinyon Jay-Sage obligates; sagebrush pollinator communication
19. Links two or more protected areas? √ for Yes (1 point), 0 for No (no score adjustment)			√	√ Encompass two ACECs. Important land connectivity would be established with Rio Grande Del Norte National Monument. The Rio Grande Mitigation Area (for the Antonito Southeast SEZ) would also link protective management with the San Luis Hills WSA.	√ 2 State Wildlife Areas; 1 Fish and Wildlife Refuge; 3 BLM ACECs; State Stewardship Trust; 1 Forest Service Research Natural Area
COMBINED SCORE: Calculate score by summing the entries in blue-shaded cells. Scores are calculated based on entries in blue-shaded cells as follows: all scaled values (i.e., ratings from 1 to 5) are summed; 1 pt is added for each check mark (√).	N/A	N/A	24	24	26

Criteria	SEZ Being Evaluated	Candidate Sites and SEZ Priority[51]				
	De Tilla Gulch	Trickle Mountain - Saguache Creek (BLM) De Tilla Gulch - 1	Sangres Foothills –BLM (also representative for De Tilla Gulch Offsets Area 3– TNC) De Tilla Gulch - 2	Poncha Pass (BLM) De Tilla Gulch -3	De Tilla Gulch Offsets Area 4– TNC De Tilla Gulch - 4	Tracy Biedell – BLM De Tilla Gulch - 5
SITE CHARACTERISTICS						
1. Total area of site (acres)	1,064	15,306	35,342	17,335	15,859	28,846
BLM Developable acres (PEIS/Recommended)	1,064/1,000	15,107	2,611	7,353		
private acres		198	26,639	5,750	1,648	
County Lands			1,057	136		
State Trust acres				244		28,846
Local Government						
State Wildlife Areas				72		
NPS						
FWS						
USFS (Rio Grande Nat'l Forest)			5,034	3,781		
Tribal Lands						
2. Sources of data for the site.	Solar PEIS					
3. Mitigates for all or most identified residual impacts that warrant regional mitigation?	Resources for Mitigation: terrestrial wildlife habitat, inter-mountain basins semi-desert shrub steppe, winterfat, shortgrass, migratory birds and raptors, special status species, EJ, hydrology, soils, visual resources	√ Pronghorn, mule deer, elk, bighorn sheep, migration corridor, connectivity, bats, visual, E. Fork Old Spanish Trail, SSS	√ E. Fork Old Spanish Trail, pronghorn, big game migration corridor, connectivity, visual, SSS, raptors, mtn. plover, swift fox, shorebirds, waterbirds	√ Pronghorn, migration corridor, connectivity, bats, visual, SSSLWC, migratory birds, hydrology, soils	√ Pronghorn, mule deer, elk, bighorn sheep, migration corridor, connectivity, bats, visual, E. Fork Old Spanish Trail, SSS	√ Pronghorn, mule deer, elk, bighorn sheep, migration corridor, connectivity, bats, visual, W. Fork Old Spanish Trail, SSS

[51] Candidate site name and priority of candidate site by SEZ as determined from Spatial Site Narrowing Exercise.

Criteria	SEZ Being Evaluated	Candidate Sites and SEZ Priority[51]				
	De Tilla Gulch	Trickle Mountain - Saguache Creek (BLM) De Tilla Gulch - 1	Sangres Foothills –BLM (also representative for De Tilla Gulch Offsets Area 3– TNC) De Tilla Gulch - 2	Poncha Pass (BLM) De Tilla Gulch -3	De Tilla Gulch Offsets Area 4– TNC De Tilla Gulch - 4	Tracy Biedell – BLM De Tilla Gulch - 5
4. Mitigation tool (restoration/enhancement, acquisition, banking, withdrawal, special designation, etc.)		Action 1. Install wildlife friendly fence for big game habitat and movement improvements Action 2. Construct wildlife water enhancements/spring developments. Action 3. Augment mitigation monitoring capabilities to increase Travel Management Plan compliance. Action 4. Rehabilitate TMP-unauthorized routes (rip/reseed), and install erosion control structures. Action 5. Old Spanish Trail NHT enhancement	√ Wetlands, grassland, pronghorn, bats, GRSA, ACEC, Refuge, SSS, T&E, visual, E. Fork Old Spanish Trail	Action 1. Install wildlife friendly fence Action 2. Develop wildlife water enhancements (i.e. stock tanks, spring enhancements) Action 3.Establish mitigation/conservation banks land acquisition/easements, riparian and upland habitat restoration Action 4. Install fence and power line avian collision deterrents and/or buried power lines.	Action 1. Install wildlife friendly fence for big game habitat and movement improvements Action 2. Construct wildlife water enhancements/spring developments. Action 3. Augment mitigation monitoring capabilities to increase Travel Management Plan compliance. Action 4. Rehabilitate TMP-unauthorized routes (rip/reseed), and install erosion control structures. Action 5. Old Spanish Trail NHT enhancement	Action 1. Install wildlife friendly fence for big game habitat and movement improvements Action 2. Construct wildlife water enhancements/spring developments. Action 3. Augment mitigation monitoring capabilities to increase Travel Management Plan compliance. Action 4. Rehabilitate TMP-unauthorized routes (rip/reseed), and install erosion control structures. Action 5. Old Spanish Trail NHT enhancement
5. Site and its proposed actions meet regional conservation/ mitigation goals and objectives? √ for Yes (1 point), X for No (-2 points).		√	√	√	√	√
Justification:		See Table 2.9	See Table 2.9	See Table 2.9	See Table 2.9	See Table 2.9
6. Consistent with the Resource Management Plan? √ for Yes (1 point), X for No (-2 points); Include justification:	Yes - RMP amended by PEIS ROD	√	√ LWCF Proposals	√ Most of this area is currently undergoing a GUSG range-wide RMP Plan.	√	√

Criteria	SEZ Being Evaluated	Candidate Sites and SEZ Priority[51]				
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7. Same HUC 4 watershed? Specify watershed.	Rio Grande headwaters	Rio Grande headwaters	√ Rio Grande headwaters	Rio Grande headwaters and Upper Arkansas	Rio Grande headwaters	Rio Grande headwaters
8. VRM and VRI Class	VRM III: 1,063.8 acres; VRI III: 1,063.8 acres	VRM II: 10,328.5 acres; VRM III: 4,985.6 acres; VRI II: 3,090.8 acres; VRI III: 12,215.3 acres	VRM II: 5,726.4 acers; VRM III: 19,455.0 acres; VRM IV: 5,172.1 acres; VRI II: 1,280.5 acres; VRI IV: 1,449.4 acres	VRM II: 10,947.1 acres; VRM III: 2,503.1 acres; VRI II: 6,712.8 acres; VRI III: 641.4 acres	VRM II: 14,836.3 acres; VRM III: 1,022.9 acres; VRI II: 5,761.6 acres; VRI III: 8,292.1 acres	VRM II: 9,998.7 acres; VRM III: 18,847.6 acres; VRI II: 2,090.1 acres; VRI III: 8,011.4 acres; VRI IV: 1,472.7 acres
9. Similar landscape value, ecological functionality, biological value, species, habitat types, and/or natural features?		√	√	√	√	√
9a. Current landscape intactness score? (Using Landscape Assessment)	High: 628; Mod High: 1,740; Mod Low: 282	Very High: 15; High: 8,512; Mod High: 3,553; Mod Low: 32,474; Low: 760	Very High: 7,239; High: 7,156; Mod High: 9,752; Mod Low: 11,218	Very High: 2,786; High: 6,364; Mod High: 3,412; Mod Low: 2,798; Low: 1,748; Very Low: 94	High: 10,921; Mod High: 1,938; Mod Low: 2,557; Low: 56; Very Low: 387	Very High: 6,746; High: 12,854; Mod High: 5,625; Mod Low: 3,350; Low: 67; Very Low: 204
9b. Dominant vegetation communities.	Inter-Mountain Basins Semi-Desert Shrub Steppe (52%); Inter-Mountain Basins Mixed Salt Desert Scrub (26%); Inter-Mountain Basins Greasewood Flat (14%)	Inter-Mountain Basins Mixed Salt Desert Scrub (30%) Inter-Mountain Basins Semi-Desert Shrub-Steppe (29%) Southern Colorado Plateau Sand Shrubland (15%)	Inter-Mountain Basins Greasewood Flat (23%) Inter-Mountain Basins Semi-Desert Shrub-Steppe (18%) Southern Colorado Plateau Sand Shrubland (15%)	Inter-Mountain Basins Big Sagebrush Shrubland (17%) Inter-Mountain Basins Big Sagebrush Shrubland (8%)	Inter-Mountain Basins Mixed Salt Desert Scrub (30%) Inter-Mountain Basins Semi-Desert Shrub-Steppe (18%) Inter-Mountain Basins Big Sagebrush Shrubland (16%)	Colorado Plateau Pinyon-Juniper Woodland (30%) Inter-Mountain Basins Mixed Salt Desert Scrub (15%) Inter-Mountain Basins Semi-Desert Shrub-Steppe (13%)
10. In SEZ Ecoregion? Specify ecoregion.	San Luis Valley - Taos Plateau	√	√	√	√	√

Criteria	SEZ Being Evaluated	Candidate Sites and SEZ Priority[51]				
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11. In SEZ ecological subregion?	Salt Flats, San Luis Shrublands and Hills	√ Foothill Shrublands, Salt Flats, San Luis Shrublands and Hills,	√ Crystalline Mid-Elevation Forests, Crystalline Subalpine Forests, Salt Flats, San Luis Shrublands and Hills, Sand Dunes and Sand Sheets, Sedimentary Mid-Elevation Forests, Sedimentary Subalpine Forests	√ Alpine Zone, Crystalline Mid-Elevation Forests, Crystalline Subapine Forests, Foothill Shrublands, , San Luis Shrublands and Hills, Volcanic Subalpine Forests, Volcanic Mid-Elevation Forests	√ Foothill Shrublands, San Luis Shrublands and Hills	√ Foothill Shrublands, Salt Flats, San Luis Shrublands and Hills, Volcanic Mid-Elevation Forests
12. Provides adequate geographic extent? Depending on whether site provides area for mitigation at least as large as the entire developable area of the SEZ. √ for Yes (1 point), X for No (-2 points).	1,064 acres	√	√	√	√	√
13. Site is within or intersects a CPW site? √ for Yes (1 point), X for No (0 points).		√	√	√	√	√
FEASIBILITY						
14. Feasibility of action? Score 1-5.		3	2	4	3	1
Justification of feasibility score: Scores for 14a through 14e were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.						

Criteria	SEZ Being Evaluated	Candidate Sites and SEZ Priority[51]				
	De Tilla Gulch	Trickle Mountain - Saguache Creek (BLM) De Tilla Gulch - 1	Sangres Foothills –BLM (also representative for De Tilla Gulch Offsets Area 3– TNC) De Tilla Gulch - 2	Poncha Pass (BLM) De Tilla Gulch -3	De Tilla Gulch Offsets Area 4– TNC De Tilla Gulch - 4	Tracy Biedell – BLM De Tilla Gulch - 5
14a. What level of documentation is available to demonstrate effectiveness of mitigation action? Use scale of 1 (little to no documentation) to 5 (well-documented).		2	2	2	2	2
Justification:		Improved range management practice for improved rangelands, documented trend studies for area.	Average documentation available	Uncertain internal documents (VRI manual); 4 - ample information for supporting wildlife friendly fencing	Improved range management practice for improved rangelands, documented trend studies for area.	Average documentation available
14b[52]. Based on action required (e.g., restoration, BLM land management action, land acquisition, Congressional action), how difficult will implementation be? Use scale of 1 (difficult) to 5 (relatively easy).		3	2	4	3	1
Justification:		Mitigation on public lands will be less difficult than actions on private lands.	Unknown and uncertain private land owner interest for easement or acquisition.	The majority of the sites are on federal lands. There would likely be public support for water improvement projects on private lands. With proper funding, fence conversions could likely occur on private lands.	Mitigation on public lands will be less difficult than actions on private lands.	Mitigation on state lands may be more difficult than on BLM lands.

[52] Rate the mitigation action for difficulty of implementation (not necessarily taking into account the success rate or effectiveness - see above for score based on documentation), based on the following scale: restoration/enhancement actions (score of 5, relatively easy); BLM planning decisions (score of 3-4, less easy to moderately complicated); land acquisition actions (score 1-3, not very easy to moderately complicated); Congressional actions (score of 1, not very easy). Ratings should be adjusted on the basis of factors such as cost of the action; time and effort requirements; public and/or BLM support for or opposition to action; and, for land acquisitions, willingness of seller.

Criteria	SEZ Being Evaluated	Candidate Sites and SEZ Priority[51]				
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14c. Time frame needed to establish site as mitigation location (estimated years)		1 to 5 years	5 to 10 years	1 to 3 years	1 to 5 years	1 to 5 years Assuming State Land Board shared goals
14d. Time frame for achieving mitigation goals and objectives from implementation (estimated years)		1 to 10 years	1 to 5 years	1 to 5 years	1 to 10 years	1 to 10 years
14e. Cost estimate (2015 $)		~$15-25K/mile wildlife-friendly fence (2015 dollars); ~$5/acre/year monitoring	Estimated easement or acquisition costs = $600-3000/acre (2015 US$); $15-25K/mile wildlife-friendly fence (2015 dollars); ~$5/acre/year monitoring	~$15-25K/mile wildlife-friendly fence (2015 dollars); ~$5/acre/year monitoring, $10,000/acre wetland restoration	~$15-25K/mile wildlife-friendly fence (2015 dollars); ~$5/acre/year monitoring	~$15-25K/mile wildlife-friendly fence (2015 dollars); ~$5/acre/year monitoring
EFFECTIVENESS / ADDITIONALITY						
15. Effectiveness and Additionality Score 1-5.		3	4	5	4	4
Justification of effectiveness and additionality score: Scores for 15a through 15c were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.		Exclusively BLM lands. Less opportunity for additionality	Opportunity for effectiveness & additionality assuming willing private owner interest	Opportunity for effectiveness & additionality assuming willing private owner interest	Opportunity for effectiveness & additionality assuming willing private owner interest	Opportunity for effectiveness & additionality assuming Colorado State Land Board shared mitigation goal interest
15a[53]. To what extent can the full spectrum of mitigation desired outcomes be met simultaneously? Use scale of 0 (low) to 5 (high).		3	4	3	3	3

[53] Rate the extent to which the mitigation desired outcomes can be met simultaneously through mitigation actions at the site, based on the following scale: all (100%) of the desired outcomes can be met (score of 5); 75-99% can be met (score of 4); 50-75% (score of 3); 25 - 49% can be met (score of 2); less than 25% can be met (score of 1); none of the desired outcomes can be met (score of 0).

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Justification:		Yes: Pronghorn, elk, mule deer (connectivity corridor), SSS (adjacent habitat protection), migratory birds, visual view (north) soils & hydrology (provides veg cover), EJ (grazing, rec opportunities, air & water maintenance); No: wetland dependent species	Yes: Cultural (Old Spanish NHT), visual, pronghorn, elk, mule deer (connectivity corridor), SSS (adjacent habitat protection), migratory birds, visual view (north) soils & hydrology (provides veg cover), EJ - pinyon harvesting	Fences could be removed and modified to aid big game migration, water improvement projects could provide habitat to migratory birds. Actions enhance and restore but don't fully replace habitat loss.	Yes: Pronghorn, elk, mule deer (connectivity corridor), SSS (adjacent habitat protection), migratory birds, visual view (north) soils & hydrology (provides veg cover), EJ (grazing, rec opportunities, air & water maintenance); No: wetland dependent species	Yes: Pronghorn, elk, mule deer (connectivity corridor), SSS (adjacent habitat protection), migratory birds, visual view (north) soils & hydrology (provides veg cover), EJ (grazing, rec opportunities, air & water maintenance); No: wetland dependent species
15b[54]. How effective will the mitigation be in the context of achieving mitigation goals/objectives for conserving/restoring ecosystem intactness? Use scale of 1 (low) to 5 (high).		3	4	3	3	3

[54] Rate the effectiveness of the mitigation actions at the site in terms of achieving mitigation goals/objectives, based on the following scale: highly effective (score of 5); moderately effective (scores of 2-4), and minimally effective (score of 1).

Criteria	SEZ Being Evaluated	Candidate Sites and SEZ Priority[51]				
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Justification:		Veg health, restrict land uses that protect visual resources, retain & conserve existing SSS habitat, protecting pronghorn movement corridors, maintain long-held grazing use, conserve watershed & air quality (EJ).	Additive and consistent with BLM Healthy Lands Focal Area; Alternatives including acquisitions with willing land owners. Wildland Urban Interface development risk.	Removal or modification of fences would aid big game migration, water improvement projects would mitigate impacts to migratory birds.	Veg health, restrict land uses that protect visual resources, retain & conserve existing SSS habitat, protecting pronghorn movement corridors, maintain long-held grazing use, conserve watershed & air quality (EJ).	Veg health, restrict land uses that protect visual resources, retain & conserve existing SSS habitat, protecting pronghorn movement corridors, maintain long-held grazing use, conserve watershed & air quality (EJ).
15c. Mitigation consists of actions that would not otherwise be undertaken by BLM.		√ Yes, Unknown or no planned funding for BLM land	Limited BLM lands	√ Yes, Unknown or no planned funding for BLM land	√ Yes, Unknown or no planned funding for BLM land	√ Yes, No planned funding as lands not under BLM jurisdiction
RISK						
16. Risk of action(s)? Score 1-5.		4	1	3	4	1
Justification of risk score: Scores for 16a through 16b were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.		No current oil/gas or mining leasing, limited off highway vehicle issues, moderate grazing compliance, climate change models show higher temp. & lower precipitation in this portion of study area.	Land owner interest; geothermal, leasable, and/or fluid mineral interest.	Limited to no constraints for wildlife friendly fencing; some complexity with fence removal; transmission line burials very complex. Higher rural home development risk proximate to Salida.	No current oil/gas or mining leasing, limited off highway vehicle issues, moderate grazing compliance, climate change models show higher temp. & lower precipitation in this portion of study area	Colorado State Land Board long-term stewardship prioritization

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16a. What are the constraints or threats to success?		No current oil/gas or mining leasing, limited off highway vehicle issues, moderate grazing compliance, climate change models show higher temp. & lower precipitation in this portion of study area.	Land owner interest; geothermal, leasable, and/or fluid mineral interest.	Limited to no constraints for wildlife friendly fencing; some complexity with fence removal; transmission line burials very complex. Higher rural home development risk proximate to Salida.	No current oil/gas or mining leasing, limited off highway vehicle issues, moderate grazing compliance, climate change models show higher temp. & lower precipitation in this portion of study area	Colorado State Land Board long-term stewardship prioritization
16b. To what extent will surrounding land uses impact mitigation success (e.g., proximity to expanding urban areas, pressures on region for recreational land use, excessive groundwater withdrawal and drawdown conditions that could affect resources on the mitigation site)?		One polygon for mitigation is adjacent to SEZ development & would impact mitigation success, subdivisions located to the north, home development pressure on private land, increased population could lead to increase recreation uses.	Unique Baca NWR reverse split estate; moderate-high Wildlife Urban Interface development risk, existing fluid mineral interest risks, along San Isabel Creek to County Rd T.	Increased population could lead to increase recreation uses and potential increase in rural residential development including fencing	One polygon for mitigation is adjacent to SEZ development & would impact mitigation success, subdivisions located to the north, home development pressure on private land, increased population could lead to increase recreation uses	Land use intensity and existing uses could impact mitigation success
DURABILITY						
17. Durability of action(s)? Score 1-5.		4	5	2	4	2
Justification of durability score: Scores for 17a through 17b were provided by stakeholders. BLM used these scores as well as their knowledge of the sites and actions.		Moderate (35%) climate change risk. Assuming secure funding, for wildlife fencing installation & maintenance but no congressional action or land use plan designation; no formal protected defined.	Moderate (36%) climate change risk Assuming secure funding, for land acquisition or easement; wildlife fencing installation & maintenance but no congressional action or land use plan designation; no formal protected defined	Very High (38%) climate change risk, Fractured land ownership patterns. Assuming secure funding, for wildlife fencing installation & maintenance but no congressional action or land use plan designation; no formal protected defined.	Moderate (55%) climate change risk Assuming secure funding, for land acquisition or easement; wildlife fencing installation & maintenance but no congressional action or land use plan designation; no formal protected defined	Some high uncertainty for durability given state land board priorities over a 20-yr period

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17a[55]. How durable would the mitigation be from a timeframe and management perspective? Use scale of 1 (low) to 5 (high).		4	4	2	4	
Justification:		Assuming secure funding, for wildlife fencing installation & maintenance but no congressional action or land use plan designation; no formal protected defined.	Assuming secure funding, for land acquisition or easement; wildlife fencing installation & maintenance but no congressional action or land use plan designation; no formal protected defined.	Assuming secure funding, for wildlife fencing installation & maintenance but no congressional action or land use plan designation; no formal protected defined.	Assuming secure funding, for wildlife fencing installation & maintenance but no congressional action or land use plan designation; no formal protected defined.	
17b. Are there potential effects of future climate change? (% of area with high or moderate potential for climate change – from LA model)	High (89%)	Moderate (35%)	Very Low (36%)	Very High (38%)	Moderate (55%)	High (34%)
PRELIMINARY SCORING: Calculate score by summing the entries in blue shaded cells. Scores are calculated based on entries in blue shaded cells as follows: all scaled values (i.e. ratings from 1 to 5) are summed, 1 point is added for each √.	N/A	22	20	22	23	16
ADDITIONAL CONSIDERATIONS						
18. Presence of unique/valuable resources or features? BLM scored 1 to 3 based on best professional judgment of resources listed in 18a-18g; most valuable resources are in BOLD.		1	3	3	1	1

[55] Rate the temporal and managerial durability of the mitigation action, based on the following scale: Congressionally protected lands would be very durable (score of 5); other federally administered lands specifically designated in land use plans or withdrawn by public land order would be moderately to very durable (score of 4-5); federally administered lands without any special designation but with enforcement oversight would have limited durability (score of 2-3); lands without special designation or enforcement oversight would not be very durable (score of 1).

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18a. Perennial, protected sources of water?		None	San Isabel Creek, emergent and playa wetlands	San Luis, Alder, Decker, Raspberry, Dorsey, Black canyon, Kerber Creeks	None	Russell Creek
18b. Unique species assemblages?	none	BLM SSS occur, habitat connectivity Lynx	BLM SSS occur, habitat connectivity, big game pronghorn corridor; shorebirds-waterbirds; sand dunes ecosystem,	BLM SSS occur, habitat connectivity between San Juan, Sangre de Cristos, and Saguache mtn. ranges. Sagebrush species assemblage, aspen species transition zone into montane and alpine zone species assemblage	BLM SSS occur, habitat connectivity	BLM SSS occur, habitat connectivity
18c. Protected species and/or critical habitat?	2 tracked species or communities by CNHP: * Great Plains salt meadows * Rhesus skipper	BLM SSS species: mtn plover, Mexican free-tail bat, Gunnison Prairie Dog,	BLM SSS species: mtn plover, Mexican free-tail bat, Gunnison Prairie Dog,	BLM SSS species: mtn plover, Mexican free-tail bat, Gunnison Prairie Dog,	BLM SSS species: mtn plover, Mexican free-tail bat, Gunnison Prairie Dog	BLM SSS species: mtn plover, Mexican free-tail bat, Gunnison Prairie Dog,
18d. Desert washes or ephemeral playas?	ESA-listed species: none (no designated critical habitat); BLM-sensitive species: mountain plover, western burrowing owl, Gunnison's prairie dog.	Ephemeral Drainages	Ephemeral Drainages; - Playa wetlands	Ephemeral drainages	Ephemeral Drainages; Intermittent streams	Ephemeral Drainages; Intermittent streams
18e. Known highly significant and unique cultural resources.	Ephemeral drainages	Old Spanish Trail, high density cultural resources - Ute Signature	Old Spanish Trail, high density cultural resources	Unkonwn	Old Spanish Trail	Old Spanish Trail, high density cultural resources - Ute Signature

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18f. Other?	Old Spanish NHT	No	Yes, Great Sand Dunes; night sky,	Pronghorn corridor, bat colony forage area, Gunnison Prairie Dog active colonies, mtn plover flyways, migratory bird flyways, big game migration corridor, Gunnison's sage grouse occupied habitat, lynx linkage area	No	No
19. Links two or more protected areas? √ for Yes (1 point), 0 for No (no score adjustment); Justification:		√ Connectivity La Garita Range, Saguache Creek, Ute Hills	√ Baca NWR, significant wetlands NPS, FWS Refuge, BLM ACEC. State Park, FS SIA; BLM SRMA; TNC easement	√ Conservation easements, National Forest wilderness/backcountry	0 No	0 No
COMBINED SCORE Calculate score by summing the entries in blue-shaded cells. Scores are calculated based on entries in blue-shaded cells as follows: all scaled values (i.e., ratings from 1 to 5) are summed; 1 pt is added for each check mark (√).	N/A	24	24	26	24	17

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