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Via email and BLM NEPA ePlanning Portal

13 February 2025

Jessica Headen
Bureau of Land Management, Southern Nevada District Office
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BLM_NV_SND_EnergyProjects@blm.gov

RE: Purple Sage Energy Center Draft Environmental Impact Statement and Draft Resource Management Plan Amendment (DOI-BLM-NV-S010-2022-0094-EIS)

Dear Ms. Headen,

The Desert Tortoise Council (Council) is a non-profit organization comprised of hundreds of professionals and laypersons who share a common concern for wild desert tortoises and a commitment to advancing the public's understanding of desert tortoise species. Established in 1975 to promote conservation of tortoises in the deserts of the southwestern United States and northern Mexico, the Council routinely provides information and other forms of assistance to individuals, organizations, and regulatory agencies on matters potentially affecting desert tortoises within their geographic ranges.

Both our physical and email addresses are provided above in our letterhead for your use when providing future correspondence to us. When given a choice, we prefer to receive emails for future correspondence, as mail delivered via the U.S. Postal Service may take several days to be delivered. Email is an "environmentally friendlier way" of receiving correspondence and documents rather than "snail mail."

We appreciate this opportunity to provide comments on the above-referenced project. Given the location of the proposed project in habitats occupied by the Mojave desert tortoise (*Gopherus agassizii*) (synonymous with Agassiz's desert tortoise), our comments include recommendations intended to enhance protection of this species and its habitat during activities that may be authorized by the Bureau of Land Management (BLM), which we recommend be added to project terms and conditions in the authorizing documents (e.g., issuance of right-of-way (ROW), management plan and decision document, etc.) as appropriate. Please accept, carefully review, and include in the relevant project file the Council's following comments and attachments for the proposed action.

The Mojave desert tortoise is among the top 50 species on the list of the world's most endangered tortoises and freshwater turtles. The International Union for Conservation of Nature's (IUCN) Species Survival Commission, Tortoise and Freshwater Turtle Specialist Group, now considers the Mojave desert tortoise to be Critically Endangered (Berry et al. 2021), "… based on population reduction (decreasing density), habitat loss of over 80% over three generations (90 years), including past reductions and predicted future declines, as well as the effects of disease (upper respiratory tract disease/mycoplasmosis). *Gopherus agassizii* (sensu stricto) comprises tortoises in the most well-studied 30% of the larger range; this portion of the original range has seen the most human impacts and is where the largest past population losses have been documented. A recent rigorous rangewide population reassessment of *G. agassizii* (sensu stricto) has demonstrated continued adult population and density declines of about 90% over three generations (two in the past and one ongoing) in four of the five *G. agassizii* recovery units and inadequate recruitment with decreasing percentages of juveniles in all five recovery units."

This status, in part, prompted the DTC to join Defenders of Wildlife and Desert Tortoise Preserve Committee (DTPC; Defenders of Wildlife et al. 2020) to petition the California Fish and Game Commission in March 2020 to elevate the listing of the Mojave desert tortoise from Threatened to Endangered in California. In its status review, California Department of Fish and Wildlife (CDFW) (2024) stated: "At its public meeting on October 14, 2020, the Commission considered the petition, and based in part on the Department's [CDFW] petition evaluation and recommendation, found sufficient information exists to indicate the petitioned action may be warranted and accepted the petition for consideration. The Commission's decision initiated this status review to inform the Commission's decision on whether the change in status is warranted."

Importantly, in their February 2024 status review, CDFW concluded: "The Department's recommendation is that uplisting the Mojave Desert Tortoise is warranted." In their April 2024 meeting, the California Fish and Game Commission voted unanimously to accept the CDFW's status review and recommendation to uplist the tortoise from threatened to endangered under the California Endangered Species Act based on the scientific data provided on the species' status, declining trend, numerous threats, and lack of effective recovery implementation and land management. The Commission is expected to vote on uplisting the tortoise to endangered in the next few months.

The Council thanks BLM for notifying us of the public comment period for this Draft Environmental Impact Statement and Draft Resource Management Plan Amendment for the Purple Sage Energy Center (DEIS and DRMPA).

Description of the Proposed Project and Alternatives

Nobel Solar, LLC (Applicant) has applied for a right-of-way grant to BLM to construct, operate, and eventually decommission the Purple Sage Energy Center Project (project) aka Golden Currant Solar Project. The 400 megawatt (MW) alternating current solar photovoltaic (PV) power generating facility with a 400 megawatt (MW) battery energy storage system (BESS), a 230-kilovolt (kV) substation, linear facilities (e.g., driveway, internal access roads, security fencing, and communication facilities), ancillary facilities, and operation and maintenance (O&M) facilities. Water for operation and maintenance would be stored in an on-site water storage retention pond or tank with the pond being "up to 6 feet tall." A new 2.3-mile long 230kV overhead generation transmission (gen-tie) line to the BLM-approved Trout Canyon Substation would convey the electricity to the regional transmission system. The project would be located on approximately 4,456 acres of BLM-managed public land (Figure 1).

In addition, the project would require an amendment to the 1998 Las Vegas Resource Management Plan (1998 Las Vegas RMP) to modify two existing undeveloped utility corridors that intersect the project ROW (please see Figure 2).

The proposed project would be located on BLM-managed land designated as a solar variance area under BLM and Department of Energy's (DOE) Solar Final Programmatic Environmental Impact Statement (FPEIS) (BLM & DOE 2012a). The project would be located in the Pahrump Valley in Clark County, just south of the Nye County border, about five miles southeast of Pahrump and 26 miles west of Las Vegas, NV. State Route 160 is less than two miles northeast of the site. Purple Sage Energy Center is one of nine solar energy projects that BLM has approved or is processing applications for approval in the Pahrump Valley. The proposed project would be adjacent to the Yellow Pine, Larrea, and Mosey Solar projects (Figure 1).

For the Purple Sage Energy Center solar project, BLM analyzed the proposed project and one action alternative in addition to the no action alternative:

No Action Alternative: BLM would not issue a ROW grant or amend the 1998 Las Vegas RMP. The project would not be constructed, and existing land uses on the project site would continue. The BLM would continue to manage the land consistent with the 1998 Las Vegas RMP.

Proposed Action Alternative (proposed project): The Applicant would construct, operate, maintain, and decommission a solar energy facility as described above. Methods used during construction include minimizing the removal and crushing of vegetation and soils to the extent reasonably practicable. Grading for facilities would occur on approximately 36 percent of the development area. For the remaining area, overland travel and "drive and crush" methods would be implemented.

Alternative 1, Resources Integration Alternative: The Applicant would construct, operate, maintain, and decommission a solar energy facility as described above. Methods used during construction include minimizing the removal and crushing of vegetation and soils to the extent "reasonably practicable." Grading for facilities would occur on approximately 36 percent of the development area. For the remaining area, overland travel and "drive and crush" methods would be implemented. Alternative 1 differs from the project by setting restoration standards to ensure that the maximum allowable long-term disturbance to vegetation is minimized and fencing larger development subareas, instead of each individual subarea being fenced.

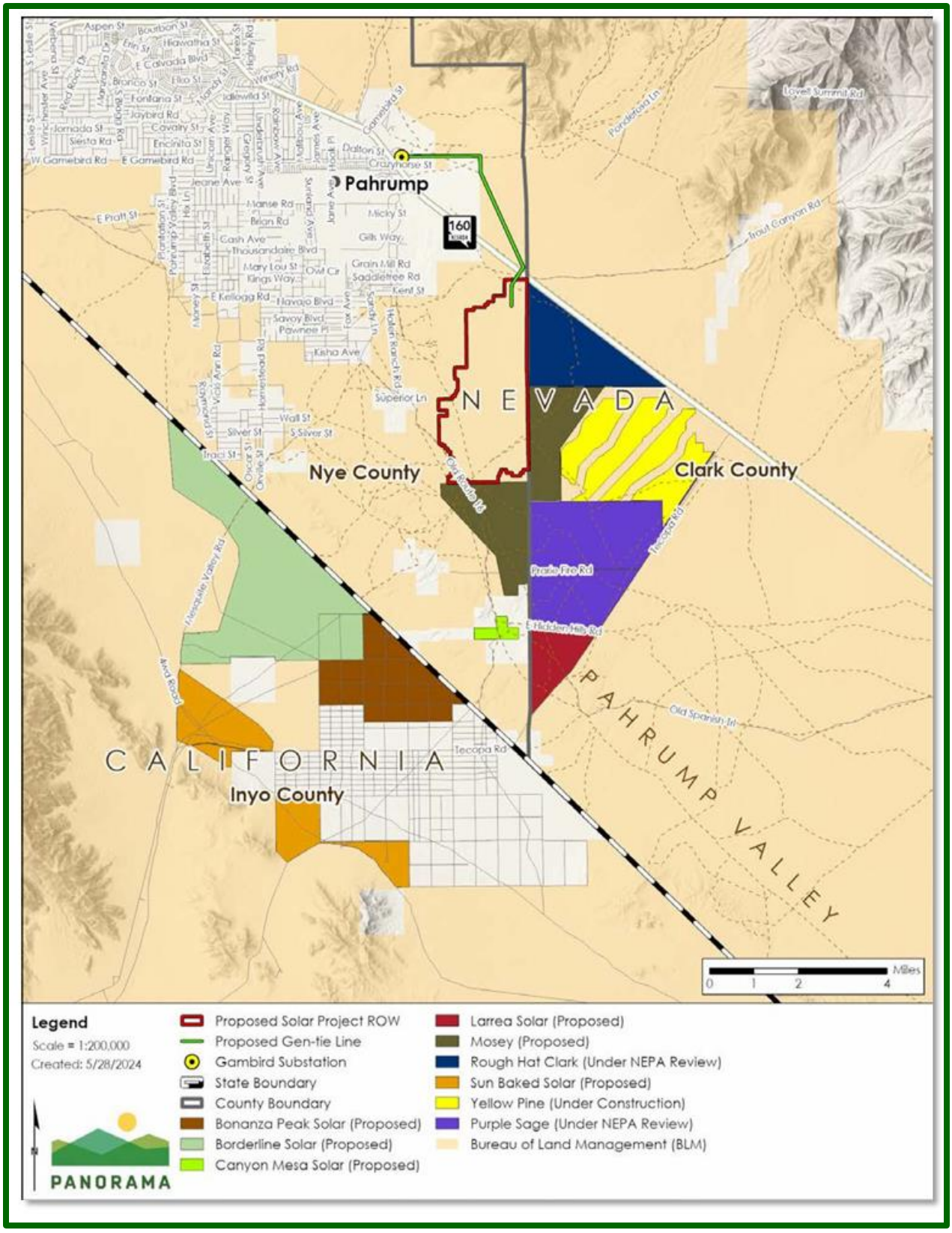


Figure 1. Location of Purple Sage Energy Center solar project and other solar energy projects (proposed, approved, and built) in the Pahrump Valley, Clark and Nye counties, NV.

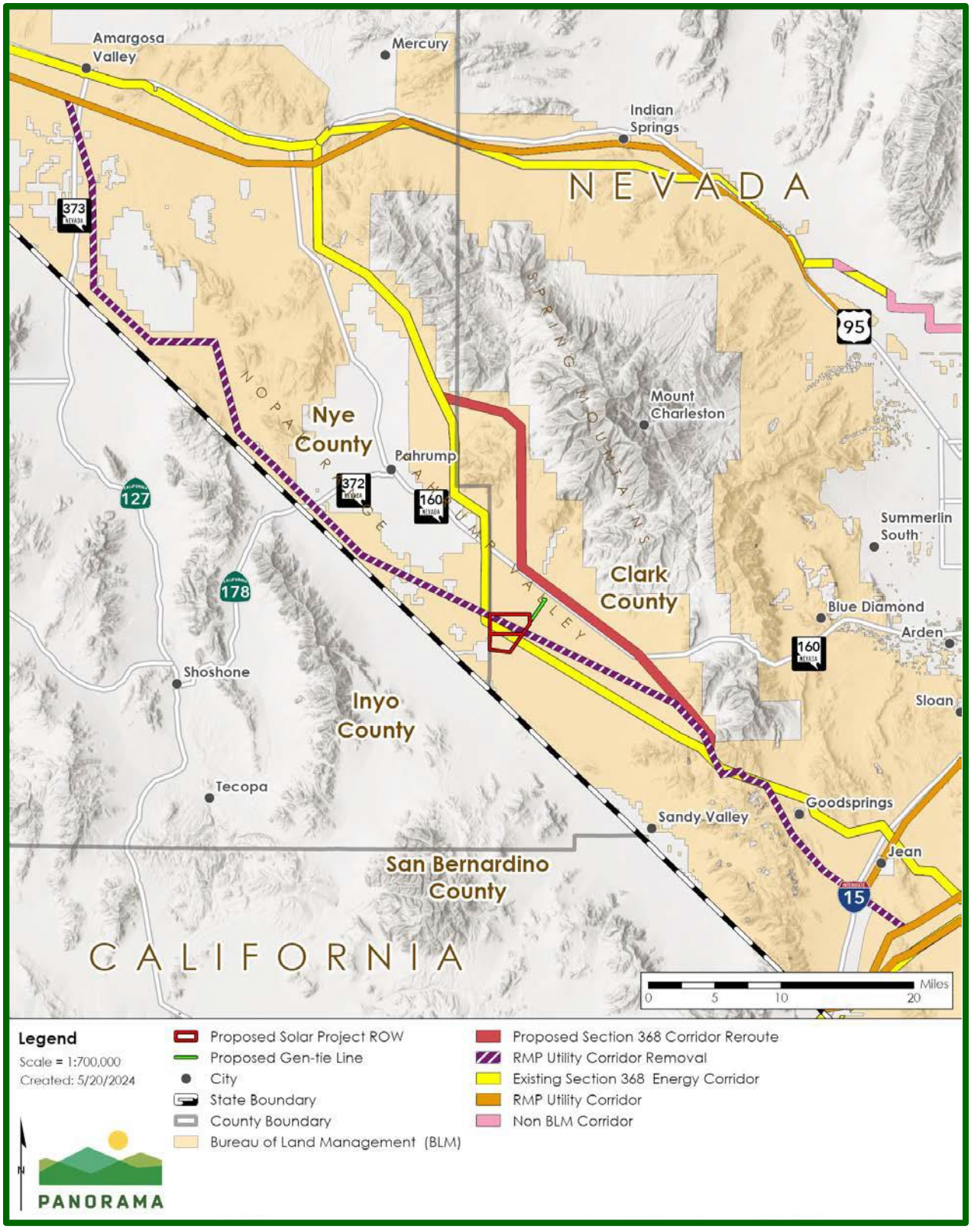


Figure 2. Locations of existing and proposed energy corridors in the Pahrump Valley, Clark and Nye counties, Nevada.

No alternative routes were provided for the gen-tie line.

Mitigation measures for both action alternatives include avoidance of major drainages, construction of tortoise exclusion fencing and wildlife access holes (10 inches tall by 12 inches wide and 5 inches off the ground) installed every 0.15 mile within a screen or tarp in the permanent outer perimeter security. The screen or tarp is to increase visual recognition by wildlife of the access holes.

For the Proposed Section 368 energy corridor, BLM identified one route. No alternative routes were identified.

Alternatives Considered and Eliminated from Detailed Analysis

Several alternatives were listed in the DEIS, which included:

- Desert Tortoise Area of Critical Environmental Concern designation;
- Desert Tortoise Reintroduction Alternative during operations and maintenance;
- Setback Alternative for the on-site substation and O&M building;
- Avoidance of the existing but unoccupied Section 368 Energy Corridor and RMP-designated Utility Corridor Alternative;
- Locating the project on Private Land;
- Locating the project on other BLM lands;
- Locating the project on Brownfield/Degraded Lands;
- Other Solar Power Technology; and,
- Distributed generation.

For the utility corridors, the alternatives that were eliminated included:

- Consolidating the corridors and rerouting the existing Section 368 energy corridor along SR 160;
- Consolidating the corridors through the Stump Springs Regional Augmentation Site as recommended by the West-wide Energy Corridor; and,
- Realigning the southern segment of the existing Section 368 energy corridor north of SR 160.

Comments on the DEIS/DRMPA

The Council has provided comment letters to BLM on several solar projects in the Pahrump Valley. These letters were intended to help BLM meet its obligations to comply with the National Environmental Policy Act (NEPA), FLPMA, Federal Endangered Species Act (FESA) and other relevant federal statutes, their implementing regulations, and policies, and Executive and Departmental Orders. In addition, we have provided information from the scientific literature that was not included in BLM's analyses and does not agree with some of the conclusions that BLM provided in their NEPA documents. Unfortunately, BLM continues to ignore the scientific and regulatory information provided by the Council, our requests for analyses of the cumulative impacts to the tortoise at the recovery unit and rangewide in their NEPA documents for projects, and our requests for effective compensation for the direct, indirect, and cumulative impacts to the tortoise/tortoise habitat. Below we reiterate our comments as they pertain to the Purple Sage Energy Center solar project with the intent that BLM will use this information and other relevant science in (1) the analysis of direct, indirect, and cumulative impacts to the tortoise/tortoise habitat; (2) decision-making for this project; and (3) implementation of effective mitigation to offset the adverse impacts including temporal impacts.

Land Management Requests/Purpose and Need/Alternatives Eliminated

According to BLM, the "purpose and need for this federal action is to respond to the ROW application submitted by Noble Solar, LLC, pursuant to Title V of FLPMA (43 United States Code [USC] § 1761) to construct, operate, maintain, and decommission the project, in accordance with the BLM's responsibilities under the FLPMA, BLM ROW regulations (43 CFR Part 2800), and other applicable federal laws and policies." BLM eliminated the request from the public to designate the area as an Area of Critical Environmental Concern (ACEC), claiming that the designation of an ACEC "would close (exclude) the area to (from) solar energy development" and "would not meet the agency purpose and need of the project described in DEIS/DRMPA." It would not allow BLM to consider the development of a solar energy facility in the project area. BLM said, "[t]he evaluation of an ACEC outside of the project area will be deferred to a future land use plan revision, which is consistent with current BLM ACEC Policy (BLM 1998; 40 CFR 1610.7-2(c))."

The Council asks BLM when it will conduct this "future land use planning revision." We ask this because the DEIS also contains a land use plan amendment for the 1998 Las Vegas RMP. It seems timely for BLM to include all requested actions that require a land use plan amendment in this DEIS/DRMPA process, not just one request.

In 2024, BLM adopted the Conservation and Landscape Health Rule (Rule) (BLM 2024a). In that Rule, BLM established the policy for BLM "to build and maintain the resilience of ecosystems on public lands in three primary ways: (1) protecting the most intact, functioning landscapes; (2) restoring degraded habitat and ecosystems; and (3) using science and data as the foundation for management decisions across all plans and programs." The Rule revised "existing regulations to better meet FLPMA's requirement that the BLM prioritize designating and protecting areas of critical environmental concern (ACECs)."

We surmise that, once BLM initiates a process to analyze and authorize a project that requires a planning amendment, there is no ability to update the analysis and/or to include other less environmentally damaging alternatives. Apparently, BLM's ROW planning process and NEPA process lack the flexibility to incorporate new scientific information or regulations/policies. This lack of flexibility, such as continuing with the implementation of the direction given in the 2012 Solar PEIS despite information released in 2015 on significant declines in tortoise densities and numbers especially in the Eastern Mojave Recovery Unit and the need to include connectivity habitat in managing for the tortoise (USFWS 2011, Averill-Murray et al. 2013, Averill-Murray et al. 2021), will now result in undue degradation to public lands that violates FLPMA unless the no action alternative is selected.

We believe that BLM should have accepted the request for ACEC designation just as it accepted the request for a ROW for solar development. The ACEC designation is not an alternative to the proposed solar development as BLM presented it in the DEIS. Rather it is a request just like the ROW request for solar energy development. As such it should be analyzed in the DEIS as a land management action, not as an alternative to the solar project. Please revise the Final EIS to provide this assessment and incorporate this change.

In addition, we believe that BLM arbitrarily narrowed the purpose and need of the DEIS to eliminate this requested action of ACEC designation and other considerations of land management in the area thereby limiting the development of alternatives to the proposed action. Please revise the purpose and need so that it is not focused to allow only one specific use on a specific area of BLM land.

Conservation and Landscape Health Rule

As previously stated, this Rule directs BLM to (1) protect the most intact, functioning landscapes; (2) restore degraded habitat and ecosystems; and (3) use science and data as the foundation for management decisions across all plans and programs. In the Final EIS and DRMPA and decision document, please clearly demonstrate how BLM is implementing these three requirements for this area of the Pahrump Valley especially with respect to the needs of listed and other special status species given the worsening impacts of climate change and cumulative impacts.

Relationship of the Project to BLM Policies, Plans, and Programs, and Land Use Plan Conformance Determination

We were unable to find a list of all BLM regulations and policies that are relevant to this proposed project with an explanation of how the action alternatives comply with these regulations and policies. Although the DEIS includes Appendix C: Laws, Regulations, Policies, and Plans, a list of these documents does not demonstrate compliance with these mandates in the DEIS and DRMPA.

Specifically, we request that BLM include in the Final EIS an explanation of how the BLM's implementation of the action alternatives would fully comply with the Council on Environmental Quality's (CEQ) directive to federal agencies on how to conduct NEPA analysis (e.g., Considering Cumulative Effects under the NEPA issued in 1997 and Ecological Connectivity and Wildlife Corridors issued in 2023), BLM's Final Programmatic Environmental Impact Statement and Proposed Resource Management Plan Amendments for Utility-Scale Solar Energy Development (BLM 2024b), BLM's (2022) policy on Habitat Connectivity on Public Lands, BLM's Conservation and Land Health Rule; and BLM policies on Special Status Species (BLM 2024c), Advancing Science in the BLM (BLM 2015), Mitigation Policy (BLM 2021a), Mitigation Manual (BLM 2021b), Mitigation Handbook (BLM 2021c), Habitat Connectivity on Public Lands (BLM 2022), and Application of the Minimization Criteria (BLM 2025) for new and existing routes in the project area with respect to management of the tortoise and tortoise habitat.

For example, we thought that BLM NEPA documents published before August 30, 2024 were exempt from complying with the Resource Management Plan Amendments for Utility-Scale Solar Energy Development (BLM 2024b), whereas BLM NEPA documents published after August 30 had to partially or fully comply with certain standards in this document. Because the Purple Sage Energy Center DEIS was published later than August 30, we believe it is not fully exempt from complying with BLM's 2024 Resource Management Plan Amendments for Utility-Scale Solar Energy Development. In reviewing the DEIS, we only found BLM referencing and following the standards in the BLM and DOE Programmatic FEIS (2012). We request that BLM clarify in the Final EIS which solar PEIS and required standards it is following, what those standards are, and why it is following those standards.

Use of Outdated NEPA Documents and Selected Information

BLM and DOE's Solar FPEIS (2012a) and BLM's and DOE's Record of Decision (ROD) (2012b) predate the publication of significant findings regarding substantial tortoise declines in numbers and densities since 2004 throughout most of the range and especially in the Eastern Mojave Recovery Unit (Allison and McLuckie 2018, and USFWS 2015, 2020, 2022a, and 2022b). The Council views these declines as significant changes affecting the survival and recovery of the tortoise. As such, BLM should include these changes in its development of alternatives and analysis of direct, indirect, and cumulative impacts rather than following the determination of a Solar PEIS with outdated information and analysis, especially with respect to the tortoise.

In NEPA's implementing regulations, 40 Code of Federal Regulations (CFR) 1502.24 Methodology and scientific accuracy, the CEQ requires that "[a]gencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements."

In the DEIS, we were unable to find an analysis of the impacts of utility-scale solar projects on the tortoise and tortoise habitat using the best available science with respect to the survival and recovery of the species, especially in combination with the ongoing and increasing severity of climate change impacts. For example, the Solar FPEIS (2012a) and ROD (2012b) predate the identification of the Pahrump Valley as a highly important area for providing connectivity among desert tortoise populations for maintaining a viable ecological network (Averill-Murray et al. 2021, Parandhaman 2023). "Maintaining an ecological network (recovery network) for the Mojave desert tortoise, with a system of core habitats (TCAs [Tortoise Conservation Areas]) connected by linkages (Hilty et al. 2020), is necessary to support demographically viable populations and long-term gene flow within and between TCAs" (Averill-Murray et al. 2021). In addition, "[l]arge, connected landscapes also are necessary to facilitate natural range shifts in response to climate change (Averill-Murray et al. 2021)." We remind BLM of the "importance of tortoise habitat outside of TCAs to recovery" of the tortoise because these areas are necessary to provide "gene flow among TCAs and minimizing impacts and edge effects within TCAs" (Averill-Murray et al. 2021).

"Ignoring minor or temporary disturbance on the landscape could result in a cumulatively large impact that is not explicitly acknowledged (Goble, 2009); therefore, understanding and quantifying all surface disturbance on a given landscape is prudent." Furthermore, "habitat linkages among TCAs *must be wide enough* [emphasis added] to sustain multiple home ranges or local clusters of resident tortoises (Beier and others, 2008; Morafka, 1994), while accounting for edge effects, in order to sustain regional tortoise populations." Consequently, effective linkage habitats are not long narrow corridors (e.g., avoiding development in washes). Any development within them has an edge effect (i.e., indirect impact) that extends from all sides into the linkage habitat, further narrowing or impeding the use of the linkage habitat, depending on the extent of the edge effect.

Averill-Murray et al. (2021) further notes that "[t]o help maintain tortoise inhabitance and permeability across all other non-conservation-designated tortoise habitat, all surface disturbance could be limited to less than 5-percent development per square kilometer because the 5-percent threshold for development as the point at which tortoise occupation drops precipitously (Carter and others, 2020a)." They caution that the upper threshold of 5 percent development per square kilometer may not maintain population sizes needed for demographic or functional connectivity; therefore, development thresholds should be lower than 5 percent.

The lifetime home range for the Mojave desert tortoise is more than 1.5 square miles (3.9 square kilometers) of habitat (Berry 1986) and tortoises may make periodic forays of more than 7 miles (11 kilometers) at a time (Berry 1986). Consequently, for linkage habitats for the tortoise to be effective, they must be areas of sufficient size and mostly devoid of development including edge effects (e.g., indirect impacts from nearby development, human activities, etc.).

Sinervo et al. (2014) used their eco-physiological model of extinction to predict the distributions of 30 desert-endemic reptile and amphibian species under climate change scenarios. The model predicted the Sonoran desert tortoise (*G. morafkai*) was at a very high risk of extinction as a result of their thermal limits being exceeded by 2070. Although this research did not include the Mojave desert tortoise, it illustrates the importance of providing functioning linkage habitats to connect the current range of the tortoise with the northward movement of tortoise habitats in response to climate change.

We were unable to find in the DEIS how BLM used this best available information from the scientific literature to develop alternatives and analyze the impacts to the tortoise especially with respect to its future survival and recovery in the Pahrump Valley and the Eastern Mojave Recovery Unit, which should be augmented in the Final EIS.

We were unable to find in the DEIS how BLM implemented this Rule especially when analyzing the impacts to the tortoise/tortoise habitat and how it would impact its survival and recovery in the Pahrump Valley and the Eastern Mojave Recovery Unit. Please correct these deficiencies in the Final EIS.

Relying on an Outdated Resource Management Plan

In the section on "Relationship of the Project to BLM Policies, Plans, and Programs, and Land Use Plan Conformance Determination," we found a reference to BLM's 1998 Las Vegas Resource Management Plan (RMP) and Appendix C of the DEIS.

BLM describes the applicable objective, policy, goal, or requirement of the 1998 Las Vegas RMP that apply to the tortoise as "[m]anage desert tortoise habitat to achieve the recovery criteria defined in the Tortoise Recovery Plan (USFWS 1994)."

The recovery or delisting criteria from the 1994 Recovery Plan (USFWS 1994) included:

(1) As determined by a scientifically credible monitoring plan, the population within a recovery unit must exhibit a statistically significant upward trend or remain stationary for at least 25 years (one desert tortoise generation);
(2) enough habitat must be protected within a recovery unit, or the habitat and desert tortoise populations must be managed intensively enough to ensure long-term viability;
(3) provisions must be made for population management within each recovery unit so that discrete population growth rates (lambdas) are maintained at or above 1.0; and,
(4) regulatory mechanisms or land management commitments must be implemented that provide for long-term protection of desert tortoises and their habitat.

The Recovery Plan also stated, "[t]o insure population persistence the Plan proposes multiple DWMAs [Desert Wildlife Management Areas, now called TCAs] connected by protected functional habitat…" and "maintaining linkages among habitat patches within DWMAs and among the DWMAs themselves is considered here to be important."

The project and the Pahrump Valley are located in the Eastern Mojave Recovery Unit, where the demographic data for the tortoise show a substantial downward trend and overall densities lower than the viability threshold (please see Attachment A). The Council concludes that since the 1998 RMP was adopted, BLM management has failed to reverse this ongoing demographic decline and is not making progress in meeting the objectives, policies, goals, or requirements of the 1998 Las Vegas RMP that apply to the tortoise.

The Council contends that the DEIS and RMPA should be revised beginning with saying "Manage desert tortoise habitat to achieve the recovery criteria defined in the Tortoise Recovery Plan (USFWS 1994) and the Revised Recovery Plan (USFWS 2011). This is necessary because the 1994 Recovery Plan did not include the impacts of climate change on the tortoise when recommending recovery tasks, including the need of the species to move with changing climatic factors and because the Revised Recovery Plan refers to the 1994 Recovery Plan."

The Council has submitted numerous comment letters to BLM that they should revise the 1998 RMP (1) to reflect the abundance of data on the declining status and trend of the tortoise and increasing number and intensity of threats to the species in southern Nevada, and (2) implement effective management to improve the demographic condition of the tortoise in the area covered by the RMP. However, BLM has not revised the RMP and continues to tier new development onto an outdated plan.

In summary, the Council asserts that BLM should not be using outdated information and resulting analyses when making planning and land use decisions. We request that BLM revise its analysis of the impacts to the tortoise/tortoise habitat and use the best available science on the tortoise (tortoise demographics, genetics, movements, behavior, physiology, nutrition, etc.) when analyzing the impacts of solar development. The Council reiterates that BLM should take this opportunity to update the RMP for what is needed for the survival and recovery of the tortoise in the planning area and not continue to rely on a RMP that is 27 years old. The Final EIS and Record of Decision for the 1998 RMP do not mention climate change. This revision is needed to reflect the increased management needs to assure the survival and recovery of the tortoise in the Las Vegas planning area.

Affected Environment

Under "Special Status Wildlife," BLM should update this section in the Final EIS to reflect that the U.S. Fish and Wildlife Service (USFWS), on December 12, 2024, proposed to list the Monarch butterfly (*Danaus plexippus*) as a threatened species and designate critical habitat under the FESA. In the "Threatened and Endangered Wildlife Species" section of the Final EIS, please update the information to include BLM's requirements under Section 7(a)(2) to confer with the USFWS on the proposed threatened Monarch butterfly under the FESA.

In the Special Status Wildlife section of the DEIS, BLM identified threats to wildlife in the Mojave Desert as habitat destruction and fragmentation caused by human development and activities, including climate change. In the Final EIS, please include direct mortality and injury to wildlife from various sources of human development and activities; frequency, intensity, and size of wildfires; and loss of native plants from wildfires and competition from invasive species.

Also, in this section of the DEIS, we were unable to find information on the current status of the tortoise in the Eastern Mojave Recovery Unit or rangewide. Specifically, BLM reported that the tortoise is present at the project site, the number of animals located during tortoises surveys a few years ago, and the estimated number present in the project area. However, we found no information on the status of the tortoise population in the Eastern Mojave Recovery Unit, the population trend in this Unit, or what is needed for the tortoise to survive and recover. Similarly, we were unable to find this information in the Environmental Consequences section of the DEIS. If BLM is to analyze the impacts of the project to the tortoise, this baseline information on the tortoise population and tortoise habitat in the Eastern Mojave Recovery Unit is needed to determine whether the tortoise population in this Recovery Unit is able to survive and recover as mandated by the BLM in the FESA and BLM's Special Status Species Handbook (BLM 2024c). We have provided status and trend data on the tortoise in the Eastern Mojave Recovery Unit in Attachment A to this comment letter and request that BLM include it in the Final EIS for the project.

Environmental Consequences

Under Environmental Consequences for Threatened and Endangered Wildlife Species, BLM discusses the translocation of tortoises and some of the associated impacts. However, the DEIS did not include the most recent information on comparison of translocations sites or social and genetic impacts of translocation on tortoises. Mack and Berry (2023) monitored translocated tortoise for 10 years. They reported that 17.7 percent of the tortoises survived, 65.8 percent died, 15.2 percent were missing, and 1.3 percent were removed from the study because they returned to the original site. Mortality was high during the first three years – more than 50 percent of the tortoises died primarily from predation. A similar result occurred from translocation of tortoise from the Yellow Pine Solar Project. Thereafter, mortality declined but remained high. Although the translocation efforts by the Marine Corps at Twentynine Palms considered some of these factors, tortoise mortality from predation was high (Henen 2024). To minimize mortality to small tortoises, these animals have been brought into headstart facilities. The Marine Corps continues to monitor the translocated tortoises.

In addition, Mulder (2017) studied translocated tortoises during the first four years and learned that male translocated tortoises did not produce offspring with resident or translocated female tortoises. This absence of successful mating at the translocation site is concerning, because it means the genes from the male translocated tortoises were not added to the population at the translocation site. Thus, the perceived benefits of genetic diversity from translocation are not fully realized.

The "success" of translocation depends on a myriad of factors including the absence of drought, the ability of the translocation area to support additional tortoises (e.g., availability of native nutritious forage (Drake et a. 2016, etc.), social interactions between resident and translocated tortoises (Sullivan, 2015, Mulder et al. 2017, etc.), the distance translocated tortoises are moved

(Mack and Berry 2023), effective management of translocation lands to eliminate human-caused threats (Berry et al. 2014, Hromada et al. 2023), the time of year tortoises are moved (Mack and Berry 2023), their physiological/hydration state (Field et al. 2018, USFWS 2019), and elevated predation (Mack and Berry 2023, Henen 2024, etc.). Translocation sites should not be managed for multiple use or any use that does not provide for the conservation of the tortoise/tortoise habitat (Berry et al. 2014).

At a minimum, a translocation plan for the tortoise should address the following questions and provide effective solutions:

- Where is the translocation site and what are the adjacent land ownership and uses (please include a map)?
- How far is the translocation site from the project area [translocation sites located close to the site from which tortoises are removed appear to contribute to higher tortoise survival than those that are farther away (Mack and Berry 2023)]?
- Who will manage the translocation site?
- How will it be managed because it is a mitigation site and no longer a multiple use site?
- Will tortoises be released in years with less than average rainfall?
- What time of year will tortoises be released?
- What are the results of tortoise surveys at the translocation site and of native vegetation surveys including annual vegetation at the translocation site?
- Are non-native invasive annual plants species present and if so, are they abundant?
- What other activities will be allowed to occur at the translocation site and adjacent areas (e.g., mining, grazing, OHV access, utility access, other activities that result in surface disturbance)?
- How will management of the translocation site, a mitigation site, be implemented and effectively enforced?
- How and when will monitoring occur (monitoring schedule) and what environmental parameters besides tortoises will be monitored?
- How long will tortoises and environmental parameters be monitored – monitoring should occur for multiple years?
- When monitoring indicates a change in management is needed, when will this change occur (adaptive management)?
- Who will fund the translocation plan and for how long?
- Will the translocation plan include management of tortoise predators?
- How will small tortoises be managed and monitored?

The Council contends the results of these studies and BLM's past inability to secure mitigation lands that are properly managed for the long-term management of translocation sites indicate that translocation of Mojave desert tortoises to date has not been an effective, successful mitigation method. Thus, avoidance of impacts to tortoises/tortoise habitat should be the preferred solution when projects that may result in the loss of tortoises are proposed. Translocation should be a last mitigation choice, not the first one.

Rather than approving development projects in tortoise habitat, especially lands with tortoise densities above the viability threshold or in important linkage areas, BLM should approve projects located outside of occupied tortoise habitat, critical habitat, and habitat needed for connectivity/movement in response to climate change. FLPMA identifies wildlife as a use and BLM should be managing it as a use. BLM should revisit the statute and Congress's intent, and ensure that the regulations for implementing FLPMA comply with the statute.

If BLM implements translocation for the tortoise rather than selecting the no action alternative, the Council strongly recommends that the Desert Tortoise Recovery Office (DTRO) have final review and approval of the translocation plan. The DTRO is comprised of biologists that are the species lead for the tortoise. The DTRO is the office that oversees the health assessments, develops translocation guidance for the tortoise, and analyzes its effectiveness. The Southern Nevada Fish and Wildlife Office focuses on implementing the regulatory aspects of the FESA, while the DTRO has traditionally focused on the science of what is needed for survival and recovery of the tortoise. Consequently, we recommend that the DTRO review and approve this Translocation Plan for the tortoise and how it is implemented.

Action Alternatives Analyzed

The comparison of the two action alternatives by BLM (e.g., in Table 2-4) shows that both action alternatives would impact the same acreage. The construction methods, operations and maintenance activities, project termination, decommissioning, site reclamation, and BLM compliance and monitoring would be the same for both action alternatives.

BLM compares the potential impacts of the proposed project and Alternative 1 (e.g., Table 7). For most of the resource issues listed in this table, the impacts of Alternative 1 are the "Same as the Proposed Action." For the few resource issues where this is not indicated, BLM claims "Less effects than the Proposed Action" because of the cap on acreage use of particular construction methods or quicker restoration of areas disturbed by construction once vegetation restoration is implemented (e.g., after the 30-year life of the project).

One main difference between the two action alternatives is that in Alternative 1 BLM requires the restoration of an additional 353 acres. We question why the proposed project does not include restoration of 353 acres of public lands to prevent undue degradation as mandated by FLPMA. Please address this question in the Final EIS.

In Table 2-4, BLM summarizes the impacts to general wildlife and special status species as ". . . habitat loss, habitat fragmentation, movement barriers, degradation of adjacent wildlife habitat, direct mortality, increased noise, dust and dust-suppression effects, light pollution effects, and increased fire risk as a result of introduction and spread of invasive weed species." Impacts to the tortoise are summarized as "Direct and indirect effects to the Mojave desert tortoise could occur from habitat disturbance caused by site preparation and construction activities associated with the Proposed Action that would affect a total of 1,507 acres of suitable habitat in the project site. Permanent security fencing and desert tortoise-exclusion fencing installed around the solar arrays and support facilities would interfere with the movement and habitat use by the desert tortoise for the life of the project." This information suggests that the impacts to the tortoise would be different and less than to general wildlife and special status species. Please correct this table and include the impacts to general wildlife and special status species in the description of impacts to the tortoise.

From information provided in the DEIS, the difference between the two action alternatives appears to be that for Alternative 1, the BLM would (1) place a lower disturbance cap for construction methods that are thought to be more damaging to the natural resources than the proposed project, (2) require additional restoration of vegetation to areas impacted by the proposed project, and (3) implement about 12 best management practices that would not be required in the proposed project (listed in Appendix F) to minimize undue degradation (e.g., "*BMP Access 3. Primary access route widths should be minimized to the maximum extent possible*").

In other words, for the proposed project, BLM would approve construction methods that would result in less minimization of impacts to resources at the project site, thus resulting in greater impact areas and degradation of public lands when this degradation is not necessary. This would violate the FLPMA that directs BLM when managing public lands "to take any action necessary to prevent unnecessary or undue degradation of the lands." Please see *Ctr. for Biological Diversity et al. v. Culver, et al*., No. 21-cv-07171-SI, 2024 U.S. Dist. LEXIS 187610 (N.D. Cal. Oct. 15, 2024) regarding minimization. Consequently, the Council does not consider the proposed project to be an alternative that when implemented would comply with FLPMA because it would result in degradation to public lands that could be avoided.

Based on the information provided in the DEIS, we consider Alternative 1 to be the proposed project. Alternative 1 appears to be the action alternative that would result in less undue degradation of public lands. The proposed project does not comply with FLPMA because it would allow degradation of public lands that is not necessary. Consequently, BLM has described and analyzed only one action alternative that complies with FLPMA. This means that BLM has not described and analyzed more than one action alternative as required under NEPA regulations and the BLM's H-1790-1 – NEPA Handbook (BLM 2008) for an EIS. The Council requests that BLM revise the Final EIS to include a description of a reasonable range of alternatives and an analysis of their impacts such that all alternatives comply with NEPA's implementing regulations and FLPMA.

Hydrological Concerns

Roads and Access: BLM states that, "[c]oncrete causeways would be used in the large, incised washes that flow through the areas with sandy natural soils to protect the road in case of large storm events." We are unclear about how and where these concrete causeways would be constructed and maintained. From our experience with causeways, if placed across washes, they would impede the flow of surface water and impede/prevent wildlife movement, especially for tortoises. If placed parallel to a wash they would remove important vegetation along the wash bank. Either design would result in adverse impacts to the habitats of wildlife species as well as vegetation in the causeway's footprints and much farther down gradient.

BLM provides a map of where the solar facilities would be located. Many would be located where small washes currently occur (Figure 3). BLM should analyze the impacts to surface hydrology both on the project site and off-site and its resulting impacts on soil moisture and vegetation. We did not find this analysis in the DEIS. Devitt et al. (2022) reported that "[c]onstruction of roads, transmission lines and utility scale solar photovoltaic facilities can decouple up-gradient washes from down-gradient locations." They reported that the decoupling of the wash system at a solar site "led to a significant decline in soil moisture, canopy level NDVI [normalized difference vegetation index] values and mid-day leaf xylem water potentials." Over time, especially combined with climate change, this impact may result in reduced plant reproduction, growth, and survival for plants down-gradient of the decoupling sites including plants not on the project site.

The DEIS provided limited information on how and where surface areas would be graded to construct, maintain, and decommission various components of the project with respect to the location of washes. Implementation of any grading or compaction would likely affect existing surface flows such that they may be decoupled or disrupted and the existing surface flows that convey surface water through the project site and farther down-gradient surface flows would be altered. Disruption of existing surface hydrology would likely impede the already slow growth rate of desert perennial vegetation or may result in plant mortality both on the project site and down-gradient.

In addition, when plants die, they release carbon from their roots, stems, and leaves into the atmosphere and contribute to climate change (Devitt et al. 2022). Given the current climate change conditions, there is an increasing need for carbon sequestration, not carbon release, therefore, an increasing need to, as a minimum, maintain native plants and not disrupt the surface hydrology of the project site. These indirect impacts should be analyzed in the Final EIS with respect to impacts on vegetation, wildlife and special status species including the tortoise. Please revise the DEIS to include this analysis.

BLM should require the Applicant to fund studies of surface flow during the construction, operations and maintenance, and decommissioning phases of the project to determine the geographic extent of the impacts of surface gradient disruption/decoupling both on-site and off-site and their impacts to the biological components of soils and vegetation. This analysis should include how the changes in surface gradients would impact wildlife, especially the availability of forage required for adequate nutrition and cover from predators and temperature extremes for all age classes of the tortoise down-gradient from the project site.

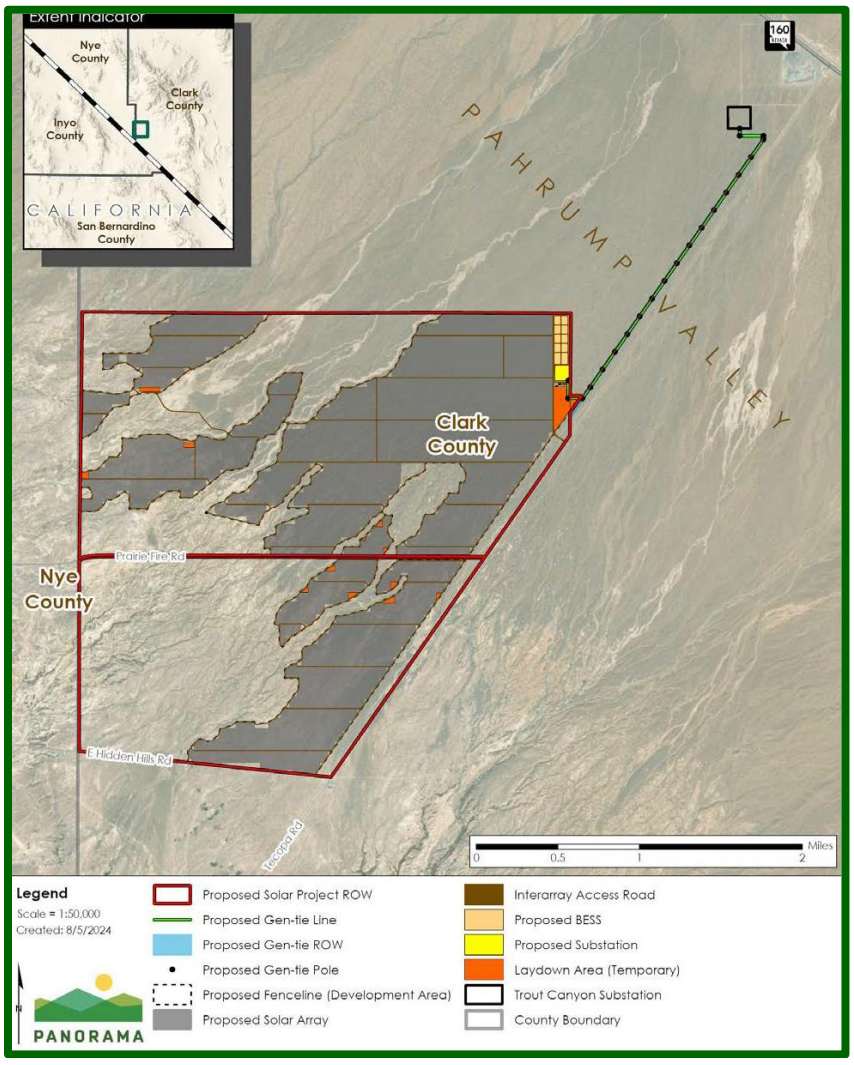


Figure 3. Locations of major and minor drainages that would be affected by the footprint of Purple Sage Energy Center solar project.

Passive Tortoise Reoccupation of the Project Site

In Table 2-5 of the DEIS and Purple Sage Energy Center Project Alternatives Report N-100225, BLM states that Alternative 1 has the potential for passive tortoise reoccupation of the site. The Council disputes this claim for several reasons stated below.

Survival of Vegetation following Construction: We question the use of "drive and crush" as a method to maintain perennial vegetation at the locations where the arrays would be located. Slade (2023) reported that this site preparation method was used in the southern California desert at a solar facility by construction vehicles "in an attempt to retain the plants' root systems." However, the environment at this solar facility with panels that track the sun was still "largely devoid of plant life more than 2 years post-construction."

When comparing cutting or pruning plants to crushing them, plants that are pruned are far more likely to survive. Pruning involves controlled removal of specific parts, allowing the plant to regrow from healthy tissue. Crushing essentially destroys the plant's structure and ability to function, making survival highly unlikely. Pruning may stimulate new growth, but not all plants can handle severe pruning. In addition, pruning should be done at the right time of the year depending on the plant species.

Heat Island Effects

Vegetation and Soils: Utility-scale PV facilities have significant impacts on local air and ground temperatures. Utility-scale PV solar projects produce increased heat. PV panels create a black barrier between the ground and the atmosphere, which alters heat flux dynamics by restricting movement of warm air up into the atmosphere similar to a greenhouse effect (Barron-Gafford et al. 2016). PV solar panels raise ambient air temperatures by as much as 3-4 degrees Celsius (°C) in the summer, creating a "Photovoltaic Heat Island Effect." A PV "heat island" effect refers to the temperatures in and around PV solar facilities increasing from the ambient temperature due to replacement of native land cover with solar panels that absorb heat. This is similar to the "urban heat island" effect, where native cover is replaced with pavement and concrete buildings.

PV solar panels convert solar radiation into heat, which can alter the air flow, energy flux dynamics, and temperatures near the panels (Fthenakis and Yu, 2013; Barron-Gafford et al, 2016). Soils, vegetation, and wildlife may be affected by such changes and increases in temperature in and around utility-scale solar facilities.

Fthenakis and Yu (2013) found that annual average air temperature in the center of a solar project at heights approximately 2.5 meters (8 feet) above the ground can reach up to 1.9 °C (3.5 °F) above ambient temperature. This thermal energy dissipates and reaches ambient temperature at 5-18 meters (16-60 feet) above the ground. This same study found a prompt dissipation of thermal energy and decrease to ambient temperatures around the PV panels at 300 meters (984 feet) away (horizontal distance) from the perimeter of the solar farm and that access roads between solar fields allowed for substantial cooling.

Devitt et al. (2022) reported that large photovoltaic facilities similar to the proposed Purple Sage Solar Project raised the air and soil temperatures not only on the project site but significant heat was moving from the solar facility into the plant community, especially in the first 200–400 meters (656 to 1,312 feet) off the project site. This rise in temperature also impacts the availability of soil moisture and the ability of burrowing animals such as the tortoise in nearby areas to reduce their body temperatures at night to conserve energy and moisture. The impacts of elevated soil and air temperatures to areas adjacent to the proposed project should be analyzed in the Final EIS including impacts to the survival, growth, and recruitment of native vegetation if this area is to be managed for wildlife use including use by tortoises.

Photovoltaic facilities can also alter the energy balance by generating heat (Broadbent et al. 2019). Nighttime temperatures over photovoltaic plants are regularly 3–4 °C warmer than over wildlands, representing a heat island effect (Devitt et al 2022). As the warmer air was displaced down gradient, the temperature front advanced into the creosote—bursage plant community with values 5 to 8 °C warmer at the 1-meter height. Similarly, Broadbent et al. (2019) found increased temperatures during the day, with an average 1.3 °C increase in air temperature in the solar field at a height of 1.5 meters (5 feet). The nighttime soil temperatures at the solar site were warmer than the reference site. The study demonstrated that shading from solar panels causes warmer soil temperatures at night.

Barron-Gafford et al. (2016) monitored three study sites [natural desert ecosystem, traditional built environment (parking lot with commercial buildings), and PV power plant], measuring air temperature at 2.5 meters (8 feet) off the ground. The average annual air temperature was greater at the PV power plant, increasing 2.5 °C during the day. Contrary to other studies, a delayed cooling of ambient temperatures was detected in the evenings, with average annual midnight temperatures increasing 3.5 °C, compared with the natural desert ecosystem. The authors hypothesized that by removing vegetation, heat-dissipating transpiration from vegetation is decreased, and compared to natural systems, the greater amount of exposed ground surfaces absorbs more solar radiation during the day, which may increase soil temperatures (Barron-Gafford et al, 2016). During the night, stored heat is reradiated, where warming under the panels may be due to the heat trapping of reradiated heat flux (Barron-Gafford et al, 2016).

Devitt (2022) evaluated a large solar facility in the Mojave Desert and the effect it had on adjacent down-gradient creosote communities. The study monitored changes in soil and plant water status over a 900-meter transect where a built service road resulted in decoupling of up-gradient washes from down-gradient locations leading to a decline in soil water in storage. Similar to other studies, air temperatures were significantly warmer near the solar facility compared to a reference point. Consistent with Barron-Gafford (2016), night temperatures were found to be higher closest to the solar facility.

The results of these studies indicate that PV solar projects increase air temperatures in the areas adjacent to the solar field – in some cases by more than 1,000 feet, change soil temperatures, and reduce soil moisture.

Notably, these studies were performed on solar sites that were graded and unvegetated. Barron-Gafford postulated that mitigation of the PV heat island effect would be achieved in part through targeted revegetation, which could ease ecosystem degradation associated with development of

utility scale solar projects (Barron-Gafford et al, 2016). Regarding nighttime temperatures, the study suggested that if the panels are mounted on a tracking system, the panels could be situated in a perpendicular position relative to the ground at night, allowing longwave radiation and trapped heat to escape to the sky, reducing the heat displacement into adjacent plant communities during the early morning hours.

Tortoises and Other Reptiles/Wildlife: How would these heat island effects affect the tortoise? Slade (2023) found that solar arrays significantly altered the surface-level thermal environment for tortoises and other reptilian species. Besides increased daytime temperatures when compared to undisturbed desert areas, Slade (2023) reported that solar arrays create a shade-warming effect; artificial shade under solar panels have significantly greater temperatures than natural shade. In addition, both fixed, shorter and the taller, sun-tracking panels of solar arrays exhibited warmer nighttime air temperatures than undisturbed sites (Slade 2023). The shade-warming effect from solar panels was most pronounced during the hottest, most thermally challenging months for reptiles.

These altered thermal environments could have unintended physiological and behavioral consequences for ectotherms such as the tortoise, given the tortoise's innate dependence on appropriate environmental temperatures for physiological function and activity. These negative consequences include extended exposure times of clutches of eggs at temperatures above thermal maximum for embryo development resulting in reproductive failure, an upward shift in their resting body temperatures that increase metabolic expenditure and water loss, negatively affecting energy balance (Nagy and Medica 1986, Sowell 2001) and therefore survival, among other physiological and behavioral concerns.

Tortoises are already living on the upper edge of their thermal limits and could be pushed closer toward extinction by an additional heating effect created by utility-scale solar arrays (Sinervo 2014). Thus, allowing federally protected species such as the tortoise access to certain areas inside solar arrays post-construction in the hopes that they can persist and move through their native home ranges beneath a newly-installed canopy of solar panels appears to be problematic based on the results of Slade's (2023) research. Until demonstrated otherwise, this treatment of solar projects as providing possible value/mitigation to the tortoise for movement and other life history requirements should be considered experimental and not mitigation for the impacts to the tortoise and tortoise habitat.

Desert tortoises are herbivores with low and narrow thermal tolerance ranges relative to other desert reptiles (Berry et al. 2021, Zimmerman et al. 1994). As their environment warms and drought periods increase, their ability to meet their increasing energetic requirements may be thwarted by decreased periods of potential activity time (e.g., reduced time for foraging) and lack of plant food and water availability, pushing them to the brink of their physiological limits (Lovich and Ennen 2011). Under current climate change scenarios without a reduction in carbon dioxide emissions, models predict that Mojave desert tortoises could approach extinction by 2080. When a 0.4 to 0.75 °C increase in air temperatures created by a photovoltaic heat island is included, these models indicate an even more rapid decline (Slade 2023).

In addition, Slade (2023) reported that "species richness is lowest in a solar array and increases with distance into natural desert habitat" and "solar arrays decrease vertebrate species richness on their edge habitats." Thus "solar arrays have a deleterious effect on species richness, with extremely few species detected compared to adjacent and control habitats."

Similar changes to the below-ground thermal environment at a solar array could be similarly problematic to the tortoise and other wildlife species. Slade (2023) reported that soil temperatures directly influence the body temperatures of burrowing reptiles (e.g., desert tortoise.). Any increase in underground temperatures could heighten water loss and resting metabolic rates for dormant reptiles and compromise their fitness and survival. This impact would be more severe for hatchling and juvenile tortoises than adults because of their small body size and larger surface to volume ratio. Thus, recruitment of young tortoises into the population would be adversely affected.

Desert tortoises, like most other turtles, exhibit temperature-dependent sex determination. Soil temperatures directly influence the incubation temperatures of tortoise nests, which affect hatchling survival and sex ratios (Slade 2023). Proper soil temperatures during incubation are critical to the survival of tortoises. With warmer ambient and soil temperatures from solar arrays, eggs laid in nests located in heat island areas of solar arrays would likely result in more hatchling female tortoises and fewer hatchling male tortoises. In addition, long-term exposure to higher temperatures results in deformities and high levels of clutch mortality (Spotila et al. 1994). Climate change would exacerbate this heat island impact on clutch survival and sex determination. Because desert tortoises depend on the suitability and reliability of their thermal environment, this makes them extremely vulnerable to temperature increases imposed by climate change, a photovoltaic heat island, or both (Slade 2023). Parandhaman (2023) reported that temperature, precipitation, and soil conditions are very important factors in determining habitat suitability for the desert tortoise.

Karban et al. (2024) described wildlife responses to utility-scale solar energy disturbance with three response strategies: avoid, tolerate, and exploit. Avoidant species avoid the disturbance, partially or entirely, to forestall negative effects of utility-scale solar energy disturbance. These species are not persistent in solar energy areas and decline if disturbance cannot be avoided. Avoidant wildlife typically has narrow or inflexible ecological niches that make them vulnerable to disturbance, such as specific habitat requirements and specialized diets. Karban classified tortoises as disturbance avoiders, possessing a number of traits (e.g., diet of diverse forb species, susceptibility to road mortality) that make them vulnerable to disturbance (Karban et al. 2024).

Based on these studies, impacts to vegetation, soils, and tortoises at solar facilities related to the PV heat island effect include increased air temperatures in the vicinity of the solar field during the day and at night as well as higher soil temperatures. Increased temperatures would impact the species composition of vegetation and wildlife at and in the vicinity of the solar facility, where temperatures could be too high and soil moisture too low for certain plant and animal species, including the tortoise to persist. Wildlife species would be displaced as they are forced to vacate the area of increased temperatures. Changes in surface hydrology at and down-gradient from features of utility scale PV solar projects may reduce water availability for vegetation communities, and changes in soil temperatures could affect persistence of vegetation and habitat suitability for burrowing wildlife forcing some species to avoid solar facilities.

While the above information is provided to inform the BLM of the latest available science that is missing from the DEIS, unless it is published in the Final EIS, the BLM will fail to adequately inform the public of the full scope and range of direct and indirect impacts that are likely to accompany project development. The DEIS is deficient in not providing this information, and the Final EIS will be equally deficient if the BLM does not publish the latest available science.

Cumulative Impacts

CEQ states, "Determining the cumulative environmental consequences of an action requires delineating the cause-and-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern. The range of actions that must be considered includes not only the project proposal but all connected and similar actions that could contribute to cumulative effects." The analysis "must describe the response of the resource to this environmental change." Cumulative impact analysis should "address *the sustainability of resources* [emphasis added], ecosystems, and human communities." For the Purple Sage Energy Center, this description of the required cumulative effects analysis would apply to the tortoise and its habitat in the Eastern Mojave Recovery Unit and rangewide (USFWS 1994, 2011). The application is rangewide in the analysis because the tortoise must meet recovery criteria in all five recovery units to be considered a recovered species. Thus, if the tortoise does not meet recovery criteria or is extirpated in one recovery unit, then the tortoise cannot be recovered.

CEQs guidance on how to analyze cumulative environmental consequences contains eight principles listed below:

1. Cumulative effects are caused by the aggregate of past, present, and reasonable future actions.
The effects of a proposed action on a given resource, ecosystem, and human community, include the present and future effects added to the effects that have taken place in the past. Such cumulative effects must also be added to the effects (past, present, and future) caused by all other actions that affect the same resource.

2. Cumulative effects are the total effect, including both direct and indirect effects, on a given resource, ecosystem, and human community of all actions taken, no matter who (federal, non-federal, or private) has taken the actions.
Individual effects from disparate activities may add up or interact to cause additional effects not apparent when looking at the individual effect at one time. The additional effects contributed by actions unrelated to the proposed action must be included in the analysis of cumulative effects.

3. Cumulative effects need to be analyzed in terms of the specific resource, ecosystem, and human community being affected.
Environmental effects are often evaluated from the perspective of the proposed action. Analyzing cumulative effects requires focusing on the resources, ecosystem, and human community that may be affected and developing an adequate understanding of how the resources are susceptible to effects.

4. It is not practical to analyze the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful.

For cumulative effects analysis to help the decision maker and inform interested parties, it must be limited through scoping to effects that can be evaluated meaningfully. The boundaries for evaluating cumulative effects should be expanded to the point at which the resource is no longer affected significantly or the effects are no longer of interest to the affected parties.

5. Cumulative effects on a given resource, ecosystem, and human community are rarely aligned with political or administrative boundaries.
Resources are typically demarcated according to agency responsibilities, county lines, grazing allotments, or other administrative boundaries. Because natural and sociocultural resources are not usually so aligned, each political entity actually manages only a piece of the affected resource or ecosystem. Cumulative effects analysis on natural systems must use natural ecological boundaries and analysis of human communities must use actual sociocultural boundaries to ensure including all effects.

6. Cumulative effects may result from the accumulation of similar effects or the synergistic interaction of different effects.
Repeated actions may cause effects to build up through simple addition (more and more of the same type of effect), and the same or different actions may produce effects that interact to produce cumulative effects greater than the sum of the effects.

7. Cumulative effects may last for many years beyond the life of the action that caused the effects.
Some actions cause damage lasting far longer than the life of the action itself (e.g., acid mine damage, radioactive waste contamination, species extinctions). Cumulative effects analysis needs to apply the best science and forecasting techniques to assess potential catastrophic consequences in the future.

8. Each affected resource, ecosystem, and human community must be analyzed in terms of its capacity to accommodate additional effects, based on its own time and space parameters.
Analysts tend to think in terms of how the resource, ecosystem, and human community will be modified given the action's development needs. The most effective cumulative effects analysis focuses on what is needed to ensure long-term productivity or sustainability of the resource.

Note that CEQ recognizes that synergistic and interactive impacts as well as cumulative impacts should be analyzed in the NEPA document for the resource issues.

Parandhaman (2023) analyzed how the compounded effects of land use and climate change would impact habitat suitability and landscape connectivity for current and future conditions for the tortoise. The habitat-based connectivity models indicated "a significant loss of connectivity in the eastern, central, and southern regions of the tortoise's range" (Parandhaman 2023). In response to climate change, tortoise habitat shifts northward (Parandhaman 2023), but dispersal of the tortoise to follow this habitat is dependent on geography (e.g., topographical and anthropomorphic barriers to movement such as development projects). Parandhaman's modelling indicates the loss of connectivity/restricted gene flow that will occur over time as a result of habitat fragmentation.

Parandhaman's research (2023) revealed the importance of valleys in southern Nevada in providing habitat for the tortoise in response to climate change now and in the future. In the DEIS, BLM lists 9 utility-scale solar energy projects among 24 past, present, and reasonably foreseeable future actions that would require BLM authorization, and maps their general locations in the Pahrump Valley and nearby (Figure 4). It does not show the footprints of the projects or the extent of the edge effects of these projects into adjacent areas of tortoise habitat (i.e., indirect impacts). For example, the solar energy projects would directly impact more than 31,400 acres with additional indirect (down-gradient loss of vegetation, heat-island effects, etc.) and cumulative impacts.

The remaining BLM-authorized projects and land use decisions would impact more areas in the Pahrump Valley. Given Parandhaman's research on the impacts of climate change and the existing impacts to tortoise habitat in the Pahrump Valley, improvement to the north-south connectivity of the tortoise in this valley with access to valleys farther north should have a high priority for BLM and be implemented immediately. BLM should use the best available scientific information to determine the current and future needs of the tortoise in the Pahrump Valley to provide and manage for effective linkage habitat between the Eastern and Northeastern Mojave recovery units and valleys to the north.

In addition, Karban et al. (2024) reported that habitat fragmentation due to utility-scale solar energy development may disrupt genetic linkages of desert tortoise in the Mojave Desert. Even if tortoise habitat remains, temperature changes within habitat patches could alter environmental sex determination in tortoises. Increased temperatures associated with solar facilities may result in production of only female hatchlings and no males. (Please see "Heat Island Effects" section below.)

When considering climate change as an impact on vegetation and wildlife, BLM's analysis should periodically be revised because the last 20+ years of climate modeling have shown that climate change models are conservative and have underestimated the impacts of climate change to flora and fauna.

Under "Threatened and Endangered Species," we were unable to find an analysis of the impacts that included the likelihood of the sustainability of the tortoise population. CEQ requires this analysis for the project along with all the other projects and land uses that have been or are likely to be approved in the Pahrump Valley and Eastern Mojave Recovery Unit.

For the proposed project and Alternative 1, BLM concluded that Alternative 1 "would result in fewer cumulative effects to habitat and desert tortoise populations in the Eastern Mojave Recovery Unit, and the projects would be in better conformance with the recovery actions recommended under the revised Recovery Plan to reduce impacts to desert tortoises from solar energy development." While implementing Alternative 1 may have fewer cumulative effectives than the proposed project, this analysis and conclusion does comply with CEQ's directive of whether the implementation of Alternative 1 with all other past, present, and reasonably foreseeable future actions would result in the sustainability of the tortoise in the Pahrump Valley or Eastern Mojave Recovery Unit, especially when including the impacts of climate change the more recent information from the scientific literature on impacts to the tortoise. Please revise the Final EIS to include this analysis and ensure that it includes information and references from the recent scientific literature that the Council provided in this comment letter.

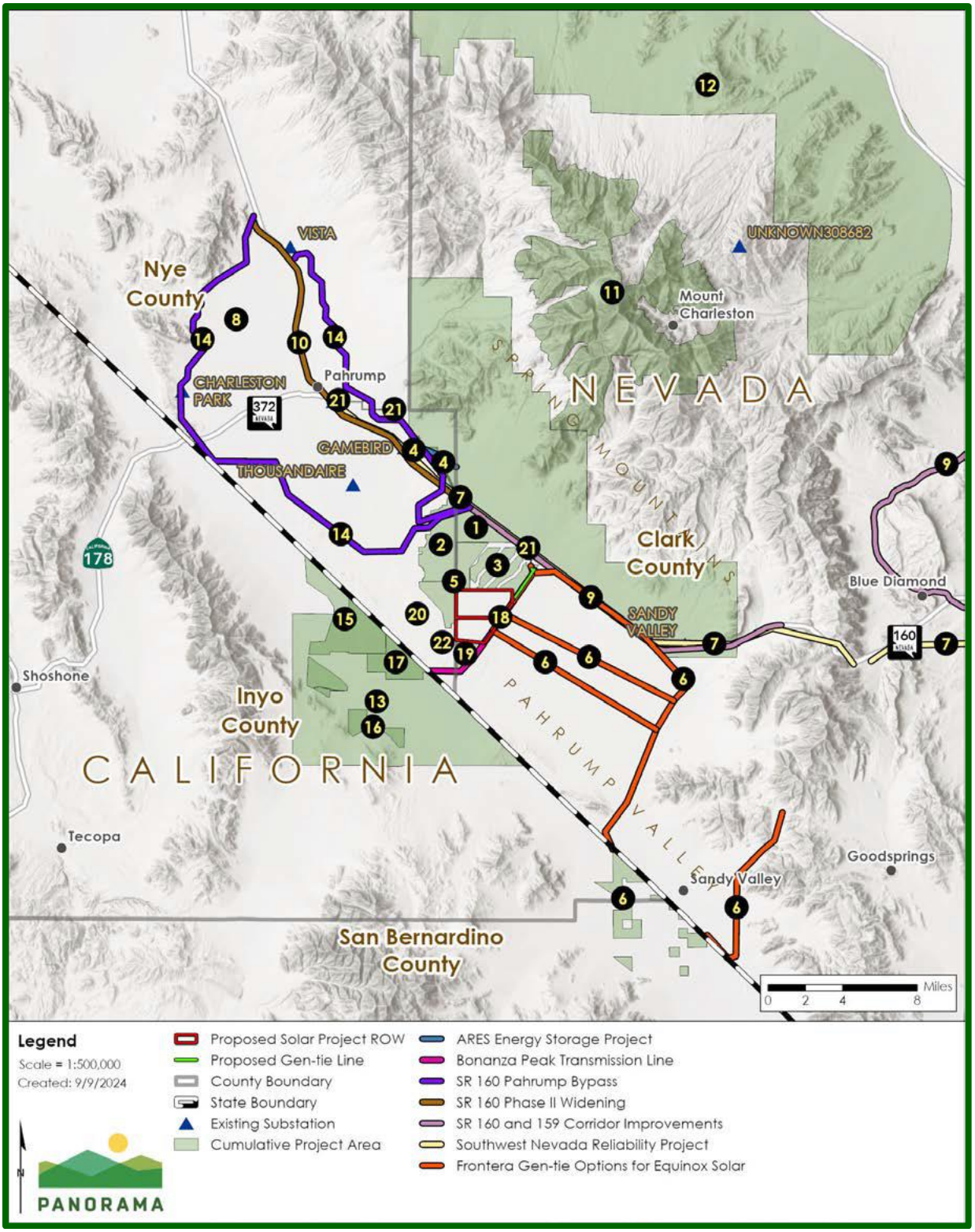


Figure 4. Past, present, and reasonably foreseeable future actions proposed within the Cumulative Effects Analysis Area that would require BLM authorization.

In the DEIS, BLM provides Cumulative Renewable Projects Approximate Disturbance Acreages for the two action alternatives that range from 31,404 acres to 31,452 acres. This reflects only the direct impacts of these solar projects. BLM also lists in Table 3.1-3 other projects in the Pahrump Valley and nearby that would require BLM approval in the cumulative effects. The approximate locations of these BLM-approved projects are mapped in Figure 3.1-2. However, in the Cumulative Effects section of the DEIS, we were unable to find a list of authorized past, present, and reasonably foreseeable future actions proposed within the Cumulative Effects Analysis Area that require other federal agency authorization (e.g., USFWS incidental take permits, etc.) and state and local agency authorizations. In addition, we were unable to find an accounting of the acreage, including acreage of tortoise habitat, that would be indirectly impacted by the project together with the indirect impacts of past, present, and reasonably foreseeable actions in the Pahrump Valley and in the Eastern Mojave Recovery Unit for the tortoise. In the Final EIS, please include this information in Figure 3.1-2, Table 3.1-3, and in BLM's analysis of the impacts of these additional actions on the survival and recovery of the tortoise in the Pahrump Valley and Eastern Mojave Recovery Unit.

In addition, we were unable to find in the DEIS any *analysis* of the cumulative impacts from this loss/degradation of tortoise habitat that includes the spatial arrangement of these impacts (see Averill-Murray et al. 2021), the documented steep declines in tortoise numbers and densities, and how these impacts and their spatial arrangement affects the sustainability of the tortoise and its habitat in the Eastern Mojave Recovery Unit and rangewide. We request that BLM include the information the Council has provided in this letter and earlier letters on solar energy projects in the Eastern Mojave Recovery Unit on indirect impacts to the tortoise/tortoise habitat in BLM's analysis of the cumulative effects of the numerous solar energy projects. BLM's analysis should also include the impacts of other projects and approved land uses to the tortoise/tortoise habitat in the Final EIS and the survivability of the tortoise given these direct, indirect, and cumulative impacts. This information and analysis is necessary for BLM to determine the appropriate types and amounts of mitigation that would be necessary for the Applicant to implement to offset these cumulative impacts under BLM's mitigation policy, handbooks, and manual (BLM 2021a, 2021b, 2021c).

We request that the Final EIS be revised to (1) include CEQ's eight principles in BLM's analysis of cumulative impacts to the Mojave desert tortoise/tortoise habitat; (2) ensure that synergistic and interactive impacts are included in this analysis; (3) address the sustainability of the tortoise in/near the project area and in the Eastern Recovery Unit especially with respect to connectivity between populations in Tortoise Conservation Areas/Critical Habitat Units (CHUs) and adjacent recovery units; (4) analyze the adequacy of the location, size, and configuration of tortoise habitat to function effectively as linkage habitat for the tortoise to respond to the effects of climate change, and (5) include effective science-based mitigation, monitoring, and adaptive management that protect desert tortoises and their habitats during BLM's management of the public lands on which it would grant a ROW.

In addition, we request that BLM add this project and its impacts to a BLM database and geospatial tracking system for special status species, including Mojave desert tortoises, that track cumulative impacts (e.g., surface disturbance, paved and unpaved routes, linear projects, invasive species occurrence, herbicide /pesticide use, wildfires, etc.), management decisions, and effectiveness of mitigation for each project. Without such a tracking system, BLM is unable to analyze cumulative impacts to special status species (e.g., desert tortoises) with any degree of confidence.

For the Utility Corridors RMPA, BLM states that "[n]o irreversible, irretrievable, or residual impacts associated with the Utility Corridors RMPA would be expected as two existing, undeveloped utility corridors would be consolidated to the one proposed reroute of the Section 368 energy corridor segment where no specific projects are proposed at this time."

The Council strongly disagrees with this conclusion and asserts that moving the two designated, undeveloped energy corridors that intersect the project (i.e., Section 368 energy corridor designated by BLM in 2009, and the Southern Nevada District utility corridor, designated in 1998) to the center of the east side of the Pahrump Valley where no transmission lines/energy corridors occur, would seal the fate of where future solar energy projects would be located. BLM has reported in numerous environmental impact statements that solar energy projects must be located near transmission lines to reduce the cost of constructing gen-tie lines from the solar energy facility to the transmission lines that distribute the electricity. It would likely result in increased off-highway vehicle (OHV) use in this part of the Pahrump Valley. The construction/maintenance road that parallels each transmission line in the energy corridor and the lateral access roads that are constructed and used during the construction and maintenance of the transmission lines would open the area to authorized and unauthorized OHV use. These additional impacts and uses bring a myriad of additional impacts to the tortoise and tortoise habitat to the eastern part of the Pahrump Valley that are not considered in the DEIS. BLM should include this information and analysis in the Final EIS for the proposed amendment to the RMP.

Because of these numerous impacts to the tortoise and tortoise habitat as well as to other wildlife species/wildlife habitat from the construction, use, and maintenance of energy corridors and resulting indirect impacts, the Council strongly recommends that the Section 368 energy corridor follow Nevada 160. This would place it next to an existing area of linear disturbance and minimize the future impacts to resources, thus resulting undue degradation to public lands.

Mitigation

Under "Relevant Required Project Management Plans, Design Features, Project Mitigation Measures, and Interagency Operating Procedures Identified in the Analysis." BLM states, "[a]dditionally, mitigation measures are proposed, where applicable, to avoid, minimize, rectify, reduce, or compensate for adverse effects from the Project."

Avoidance Areas: BLM provided a map of areas the utility-scale solar projects in the Pahrump Valley are avoiding during construction, operations and maintenance (Figure 5). As demonstrated by the locations of the avoidance areas and the scale of the map, these avoidance areas would provide little to no benefit to the tortoise for providing movement between populations and in response to climate change. This conclusion is based on recent [post BLM & DOE Solar PEIS (2012)] research. We refer BLM to our information provide above under "Use of Outdated NEPA Documents and Selected Information" and "Relying on an Outdated Resource Management Plan." For example, the information provided above shows that the "habitat linkages among TCAs must be *wide enough* [emphasis added] to sustain multiple home ranges or local clusters of resident tortoises (Beier and others, 2008; Morafka, 1994), while accounting for edge effects, in order to sustain regional tortoise populations."

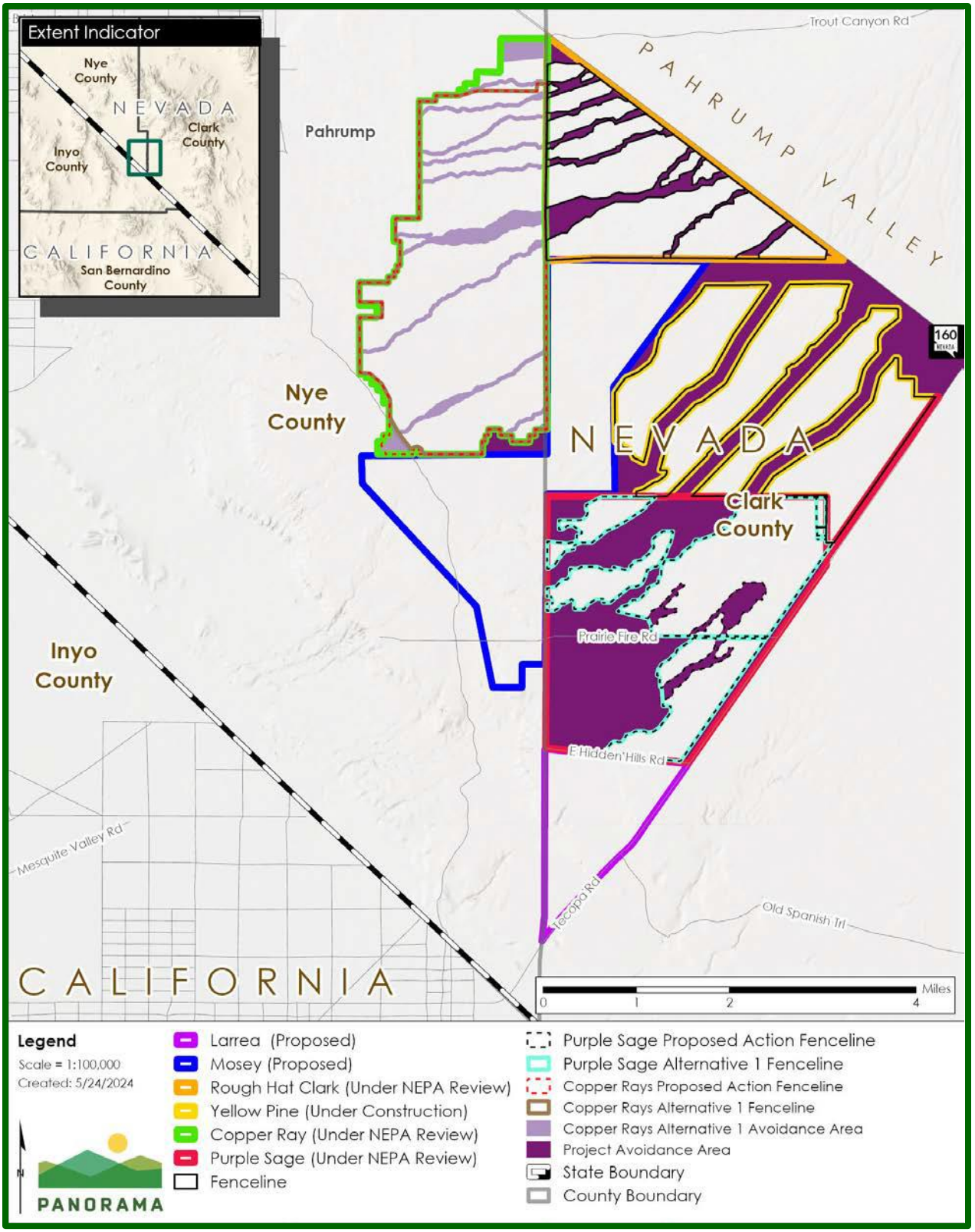


Figure 5. Adjacent Cumulative Solar Projects' Known Avoidance Areas in the Pahrump Valley – Purple Sage and two other solar energy projects, Clark and Nye Counties, NV.

These BLM avoidance areas would provide little to no benefit to the tortoise as linkage habitat. Thus, we conclude that these avoidance areas would not provide mitigation for the loss of tortoise habitat until well after the project had been decommissioned and restoration effectively implemented to return the current ecological functions and values to the project site. This restoration would take decades if not longer (Abella 2010).

Restoration: Under "Requirements under Decommissioning" and in Table 2-6, BLM states that the Applicant shall minimize perennial vegetation impacts during decommissioning to maintain a minimum of 60 percent perennial vegetation density throughout the panel array blocks that remain un-graded. In the Alternatives Report for the DEIS is the following statement, "Restoration is considered successful if native perennial vegetation is equal to or exceeds 60-percent density of undisturbed reference area."

In the DEIS and this appendix we were unable to find citations from the scientific literature that support BLM's determination that maintaining 60 percent density of perennial vegetation is adequate to meet the habitat requirements for the tortoise and other special status species that would reoccupy the project site including under the solar arrays. Apparently, BLM has not provided scientific information to support the effectiveness of this density threshold for vegetation for other solar projects.

In the DEIS for the Bonanza Solar Project (BLM 2024d), BLM reported the standard for maintaining perennial vegetation as 65 percent and 75 percent. Because of the inconsistent standards between solar projects in southern Nevada's Mojave Desert and the absence of citations to support this standard, we consider this amount to be arbitrary and unsupported as being effective for providing the necessary habitat requisites for the tortoise to occupy the project site during and after decommissioning. Please provide appropriate citations and data to determine the level of native perennial plant density needed by the tortoise and other special status species for feeding, breeding, shelter, and movements within and between populations and provide that information in the Final EIS.

BLM needs to look beyond a perennial vegetation density requirement. BLM should require that plant species composition/diversity, cover, and distribution as well as density for both native annual and perennial vegetation meet the physiological and nutritional needs of the tortoise, or exceeds them, for energy and water balance (Henen 2002), protein (Drake et al. 2016), and other important nutritive components (Abella and Berry 2016, Oftedal et al. 2002). These requirements should include all age classes and reproductive females (Nagy et al. 1998, Oftedal 2002, Hazard et al. 2010, Drake et al. 2016), as well as requirements for breeding and shelter.

In setting a restoration threshold for vegetation, BLM should include the needs of the target wildlife species and require restoration of vegetation to meet the needs of those species. The vegetation needs vary among wildlife species. If the target species for wildlife management is a coyote, the perennial plant density for this wide ranging apex predator is likely very different than for a ground-nesting bird, lizard, or small mammal. In addition, perennial vegetation, which is mostly woody vegetation in the Mojave Desert, provides cover for wildlife species. Herbaceous vegetation, which is mostly species of annual plants, provides much of the nutritional value and water for the diets of most herbivorous wildlife species with small territories/home ranges, who are not at the top of the food web but provide the food for the wildlife above them on the food web (i.e., omnivores and carnivores).

If BLM is requiring this reduced density restoration threshold for vegetation, we remind BLM of its mandates under FLPMA. Under multiple use, BLM is mandated to implement "harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment." BLM is also mandated under FLPMA to manage for sustained yield of resources including wildlife and vegetation. FLPMA directs BLM to "take any action necessary to prevent unnecessary or undue degradation of the lands." Accepting 60 percent of the reference density of perennial vegetation allows for 40 percent degradation of the lands, which we contend is not in compliance with FLPMA.

Consequently, the Council finds that BLM's determination of 60 percent for meeting restoration standards with no science provided to support this determination as arbitrary. Please correct this determination and demonstrate how BLM's revised threshold for vegetation restoration would restore the ecological functions and values (this is an established standard by other federal agencies) that were lost/degraded from the implementation of this project, especially to the vegetation and wildlife, including the tortoise.

Above-ground vegetation restoration that includes perennial plant species composition/diversity, cover, distribution, and density of perennial plants is one of many biotic and abiotic components that comprise the habitat needs of the tortoise and other special status species. As mentioned above, other components including, but not limited to, the species composition/diversity, cover, distribution, and density native annual plant species; the absence of invasive plant species (Drake et al. 2016); surface flow and soil moisture (Devitt et al. 2022, Hamerlynck et al. 2002); soil biotic components (Chiquoine et al. 2016, Hernandez et al. 2023) must be sought.

In addition, proximity to roads and other anthropomorphic features (e.g., transmission lines with roads underneath them and structures that provide nest sites for common ravens, etc.) and OHV activities that act as population sinks should be analyzed and managed in the restoration requirements. Nussear (2023) reported that highways have likely impacted tortoise habitat and adjacent populations for decades (von Seckendorf Hoff and Marlow 2002; Boarman and Sazaki 2006; Nafus et al. 2013; Peaden et al. 2015), and thus while habitat condition may appear unaffected, tortoise densities may be lower due to these impacts. BLM should include these factors as well as others with native perennial plant density when determining success criteria for restoration of the impacted area. Because the tortoise is a keystone species (Berry and Medica 1995), the habitat needs of the tortoise should be one of the species BLM uses to determine whether restoration has been successfully implemented.

In addition, we were unable to find in the DEIS that BLM included an analysis of the indirect effects of the "road effect zone" on the tortoise and other wildlife species. Linear disturbances from projects and associated activities such as transmission lines, roads, and OHV use have been well documented in the scientific literature and should be included in the DEIS because BLM is analyzing the impacts of the of the proposed gen-tie line and the Section 368 energy corridor designation. BLM's analysis is limited to "certain activities associated with the development, operation and maintenance, and decommissioning of an energy transport project have the potential to affect tortoises . . ." General types of effects are as described in Section 3.3: Wildlife, Migratory Birds, and Special Status Wildlife as well as the West-wide Energy Corridor PEIS and include habitat disturbance and potential for direct harm to individuals."

In reading Section 3.3 in the DEIS, we found no description or analysis of the impacts of the "road effect zone," which includes several indirect impacts that are well-documented for the tortoise, including, social, behavioral, and physiological impacts, and other species of wildlife. For example, for graded, unpaved roads, the reduction in tortoises and sign was evident 1.1 to 1.4 km (3,620 to 4,608 feet = 0.68 to 0.87 mile) from the road (Von Seckendorff Hoff and Marlow 2002). Averill-Murray and Allison (2023) provided a case study on the Mojave desert tortoise from the impacts of road use (including OHV routes) and stressed that identifying the entire travel network within management areas and setting limits for road density with lower road densities in areas with greater tortoise numbers. We were unable to find this information and analysis of the impacts of road densities for the areas around the project area and proposed energy corridor to the tortoise/tortoise habitat. Please include this analysis in the Final EIS.

Minimization of Impacts

In the Environmental Effects section of the DEIS, BLM listed six draft management plans:

- Purple Sage Energy Center Dust Control and Air Quality Plan (including Dust Abatement Plan)
- Purple Sage Energy Center Fencing Plan (including Desert Tortoise Exclusion and Security)
- Purple Sage Energy Center Lighting Plan
- Purple Sage Energy Center Bird and Bat Conservation Strategy Plan
- Purple Sage Energy Center Restoration-Revegetation and Decommissioning-Reclamation Plan
- Purple Sage Energy Center Integrated Weed Management Plan.

Our understanding is that these plans, when implemented, are intended to minimize impacts to natural resources including special status species and the tortoise. The Council thanks BLM for providing these draft plans and requests that additional plans be included in the Final EIS including the tortoise translocation plan, predator management plan, fire prevention/management plan, and habitat compensation plan. Each plan should include a monitoring and adaptive management plan that is science-supported, statistically robust, and quantitative. In addition, we ask BLM to explain why these documents are separate from the DEIS, that is, they are not titled as appendices to the DEIS. Please clarify whether BLM would require the Applicant to implement them.

In the DEIS, BLM provided a list of project management plans that would be required and implemented during project construction, operation and maintenance, and decommissioning:

- Dust Control and Air Quality Plan (including Dust Abatement Plan)
- Site Restoration-Revegetation & Decommissioning-Reclamation Plan
- Integrated Weed Management Plan
- Bird and Bat Conservation Strategy Plan
- Fencing Plan (Desert Tortoise Exclusion and Security)
- Nuisance Animal and Pest Control Plan
- Technical Drainage Plan
- Lighting Plan
- Common Raven Management Plan
- Southern Nevada Nesting Bird Management Plan

- Project-Specific Desert Tortoise Translocation Plan tiered from the Translocation Plan for the Stump Springs Regional Augmentation Site
- Worker Education and Awareness Plan
- Spill Prevention, Control, and Countermeasures Plan
- Health and Safety Plan (includes Fire Management Plan and Emergency Response Plan)
- Hazardous Materials and Waste Management Plan
- Trash Abatement Plan.

The Council requests that the Common Raven Management Plan be expanded to be a Predator Management Plan at the solar facility and gen-tie line. Please add the Wildlife Monitoring Plan for the use of the project site after construction and specify that it is the responsibility of the Applicant to implement these plans effectively.

Translocation: The Council contends that a translocation site that receives tortoises to minimize direct mortality at the development site functions as a mitigation site. Consequently, it should be managed exclusively for the benefit of tortoises, which will in turn benefit other species. BLM is obligated to remove it from multiple use management, and allow only uses that are documented to be compatible with tortoise conservation. In addition, it is unlikely that the project site will be restored to tortoise habitat in the foreseeable future (Abella 2010). Because of this permanent loss of tortoise habitat, the translocation site should be managed in perpetuity for the tortoise.

Habitat Compensation: We were unable to find in the DEIS and DRMPA that BLM would require compensation for the destruction and degradation of tortoise habitat from the impacts of the action alternatives. BLM is requiring restoration of vegetation but most of that would not begin until after decommissioning (i.e., 30+ years after construction begins). That delay results in a temporal loss of habitat for the tortoise that is not analyzed in the DEIS. In addition, BLM is "discounting" the restoration requirements by requiring only 60 percent restoration of plant cover rather than 100 percent.

The proposed project and Alternative 1 would result in the loss of important linkage habitat for the tortoise within the Eastern Mojave Recovery Unit and its ability to adapt to climate change. The Council strongly requests that BLM require the Applicant to compensate for the loss of this important tortoise habitat. Such compensation is described in BLM's Mitigation Policy (BLM 2021a, 2021b, 2021c) to mitigate for the direct, indirect, and cumulative impacts that remain after avoiding, minimizing, reducing, and rectifying forms of mitigation. The Council insists that BLM require the Applicant to acquire and manage in perpetuity the ecological equivalent of the functions and values of the tortoise habitat, including habitat connectivity, that would be lost or degraded because of the implementation of the action alternatives. These lost functions and values would include the temporal loss of habitat. This requirement would demonstrate compliance with BLM's Mitigation Policy and 50 CFR 402.14(2). Please include this information in the Final EIS.

BLM should require the Applicant to implement compensation rather than pay an arbitrary mitigation fee. The mitigation fee is a requirement that is deeply flawed. The formula used in the past for calculating the mitigation fee does not consider realistic costs to implement ongoing management, monitoring, enforcement, and adaptive management to ensure that the actions to improve or protect the impacted resources elsewhere than the project site are adequately funded. This is especially true if BLM plans to require implementation of science-based management,

monitoring, and adaptive management. For example, in the past, the per-acre acquisition, restoration, and preservation fee, the effectiveness monitoring fee, and the law enforcement fee were each a one-time fee of $10 per acre. For a solar energy project with a typical life of 30 years, this is 33 cents per acre per year with no consideration of increased costs for labor, equipment, and supplies during the 30-year life of the solar project from inflation. This is less than $17,000 to be paid to fund each of these activities for 30 years.

Taking a closer look at costs for implementing law enforcement, BLM believes these costs to be under $17,000 for the management and monitoring of human activity associated with this 30-year solar project. Our understanding is the cost of training, equipping, and paying one law enforcement person is more than $200,000 per year in 2023 dollars. This amount will increase during the next 30 years; it will likely be more than double if future costs increase at a rate similar to the last 30 years. However, assuming costs would not increase during the next 30 years and applying all the funding to salary only (not vehicles and other equipment, training, benefits, etc.), the proposed funding by BLM would allow for law enforcement to spend 0.56 percent of one law enforcement person's time per year of this project. The Council considers this fee unrealistic to effectively implement law enforcement or for the acquisition, restoration, and preservation fee, or the monitoring fee (because BLM is using the same monetary amount for these activities). In addition, the Council found no guaranteed funding for adaptive management in the DEIS. Is BLM presuming that all management will be effective and no additional management or modifications to management and monitoring will be needed?

The Council concludes that the amounts required in mitigation fees for past projects in tortoise habitat are not realistic estimates. BLM does not provide an adjustment for changes in costs for the life of the project due to inflation. Time is also not included in the calculation. Some ecological functions that would be degraded or lost take decades to recover with active management [e.g., the time required to replace lost/degraded vegetation may take several decades (Abella 2010)]. The life of the project is 30 years. The time needed to improve the vegetation to partially offset the loss will take more than the 30 years. Thus, the additional mitigation should be included to offset the temporal loss of these resource values and functions.

For these and other reasons, the Council recommends that BLM not assess a mitigation fee. Rather, the BLM should require the Applicant to implement the mitigation including the monitoring and adaptive management. The mitigation would be paid for by the Applicant and implemented by a neutral third party so as to avoid undue influence.

Specific Comments on the DEIS

Page 2-12, Wildlife Access: The following conflicting information is provided in the DEIS. "Wildlife access holes (10 inches tall by 12 inches wide) would be installed every 0.15 mile, within the permanent outer perimeter security and tortoise fencing. These wildlife access holes would be designed for use by small- to medium-sized mammals such as kit foxes, desert cottontails, and black-tailed jackrabbits as well as bird species such as great[er] roadrunners while entirely excluding site access by desert tortoises. The bottom of the access holes would be set at 5 inches from the ground to facilitate access into and out of the facility for general species and would be installed within the bottom-half center of a 10-foot by 4-foot screen or tarp secured to the fence in order to increase visual recognition for wildlife."

Later in the DEIS, BLM says "because there is a potential for adults [tortoises] to traverse the openings, USFWS fence specifications also require shade structures on both the inside and outside of the perimeter fencing." Please revise the Final EIS so the information provided on the use of these access holes is consistent with respect to tortoise access, potential use, and mitigation requirements.

We were not able to find a requirement that this height between the ground and the bottom of the access holes would be maintained as part of the fence maintenance requirements or the frequency of this maintenance (e.g., immediately after a rainfall event, etc.) for longer than 1 or 2 years when the life of the project is 30 years. Thunderstorms, other natural events, and human activities are likely to alter the height of this opening by acting as a barrier to accumulate debris and soil, vegetation, and debris from natural and human sources or damage the fence/fence opening. Hatchling tortoises are 40-50 mm (1.6-2.0 inches) long while subadult and young adult tortoises may be 180-200 mm (7-8 inches) long, both of which would easily fit through the 12-inch wide holes described above. We expect that the following sentence should be added to the Final EIS to include that "Access holes are expected to be exclusionary to desert tortoises, though the potential for both larger and smaller tortoises to traverse through the openings may exist."

BLM further explains that because these openings in the fences "would be considered experimental, the BLM may install camera traps to monitor species diversity and volume of use over the initial year of implementation at all or a subset of openings. Data would be retrieved, and camera maintenance conducted once per month by BLM staff over the 12-month period (Monitoring period may be extended up to 2 years dependent upon the quality and quantity of data collected within the initial trial year)."

We ask whether BLM staff has the time and/or resources to conduct this monitoring for a year or longer and how BLM would collect, analyze, and use the data? In addition, the Applicant, not BLM, should be required to monitor these openings regularly and correct any damage/alteration that causes them to not function for their intended purpose of facilitating wildlife movement. This is needed because they may become damaged or clogged from soil or trash transported by wind or water and the screen or tarp may degrade, tear, and block the opening.

Because this measure and others in the DEIS are experimental with respect to the tortoise, their implementation should not be considered as mitigation until the results and analysis of the experiment are complete and found to be highly successful, which from a scientific perspective this desired goal would be 90 to 95 percent successful. If not successful, BLM should require additional mitigation from the Applicant to comply with BLM's Mitigation policy, Handbook, and Manual (BLM 2021a, 2021b, 2021c) and Section 7 of the FESA to minimize the impacts of the taking. Failure to maintain these openings may result in tortoises being caught in them resulting in additional incidental take. Consequently, their maintenance should be required of the Applicant for the life of the project.

In summary, in the Final EIS, BLM should use current information and resulting analyses for this project, and ensure that its alternatives fully comply with NEPA, FLPMA, FESA, and BLM's regulations and policies especially with respect to impacts to the tortoise/tortoise habitat. We request that BLM revise its analysis of the impacts to the tortoise/tortoise habitat and use the best available science on the tortoise (tortoise demographics, genetics, movements, behavior,

physiology, nutrition, etc.), the impacts of solar development, the impacts of other current and future anthropomorphic activities in the analysis area for the tortoise – including projects and land uses that are authorized by other agencies, and the impacts of climate change when analyzing the impacts of the project on the tortoise, tortoise linkage habitat, and the survival and recovery of the species in the future. In reviewing the DEIS, the Council was unable to find that BLM incorporated these factors in its analysis of the impacts to the tortoise and tortoise habitat or complied with 40 CFR 1502.24 on "Methodology and scientific accuracy." Further, we were unable to find that BLM is requiring mitigation to offset the degradation and loss of tortoise habitat as required in BLM's Mitigation policy.

Comments on Appendix B, Design Features, Mitigation, Plans, and IOPs

Page 15: "For projects that affect desert tortoise linkages, developing and implementing a Desert Tortoise Habitat Linkage Management and Monitoring Plans and a Desert Tortoise Population Connectivity Effectiveness-Monitoring Plan as described in the USFWS Biological Opinion and Conservation Review for the Solar Energy Program (July 20, 2012)." Because this was a requirement of BLM to implement in a biological opinion issued by the USFWS in 2012, we believe BLM should have already developed a Desert Tortoise Habitat Linkage Management and Monitoring Plan and a Desert Tortoise Population Connectivity Effectiveness-Monitoring Plan. Please includes these plans in the Final EIS.

Page 40, MM WILD-3: Desert Tortoise Burrow Avoidance: BLM states, "For the action alternatives that involve retention of vegetation, an authorized biologist will map and flag desert tortoise burrows prior to fence and solar array block installation." "Class 1, Class 2, and intact Class 3, tortoise burrows will be avoided to the maximum extent possible during solar array block construction." "If [burrow] occupancy is negative or cannot be established, the burrow will be carefully excavated with hand tools."

According to information provided in this appendix, more than 900 Class 1, 2, and 3 burrows were located on the project site (Figure 6).

The Council has several questions with respect to this information. First, the USFWS's protocol calls for the "action area" to be surveyed. However, the information this appendix indicates the results for surveying only the project site. The "action area" is defined in 50 CFR 402.2 and the USFWS Desert Tortoise Field Manual (USFWS 2009) as "all areas to be affected directly or indirectly by proposed development and not merely the immediate area involved in the action area" (50 CFR 402.02). Thus, the action area where this 100% coverage survey should have occurred is larger than the project footprint/project site. Please revise the information in this appendix to include the results of conducting USFWS protocol level surveys for tortoises/tortoise sign for the action area including the areas impacted down-gradient from the project site by the disruption of surface hydrology (affecting the survival and availability of vegetation) and the heat island effect.

Second, we are unclear how the Applicant would effectively avoid the 900+ tortoise burrows on the project site during solar array block construction. Most solar arrays are located in the up-gradient/northeastern part of the project site which is where the majority of the tortoise burrows are located (Figure 6). During construction, it seems unlikely that most of these burrows would be avoided. If we are correct in this conclusion, then BLM should revise the information in the DEIS and state that most of the tortoise burrows would be destroyed during the construction phase.

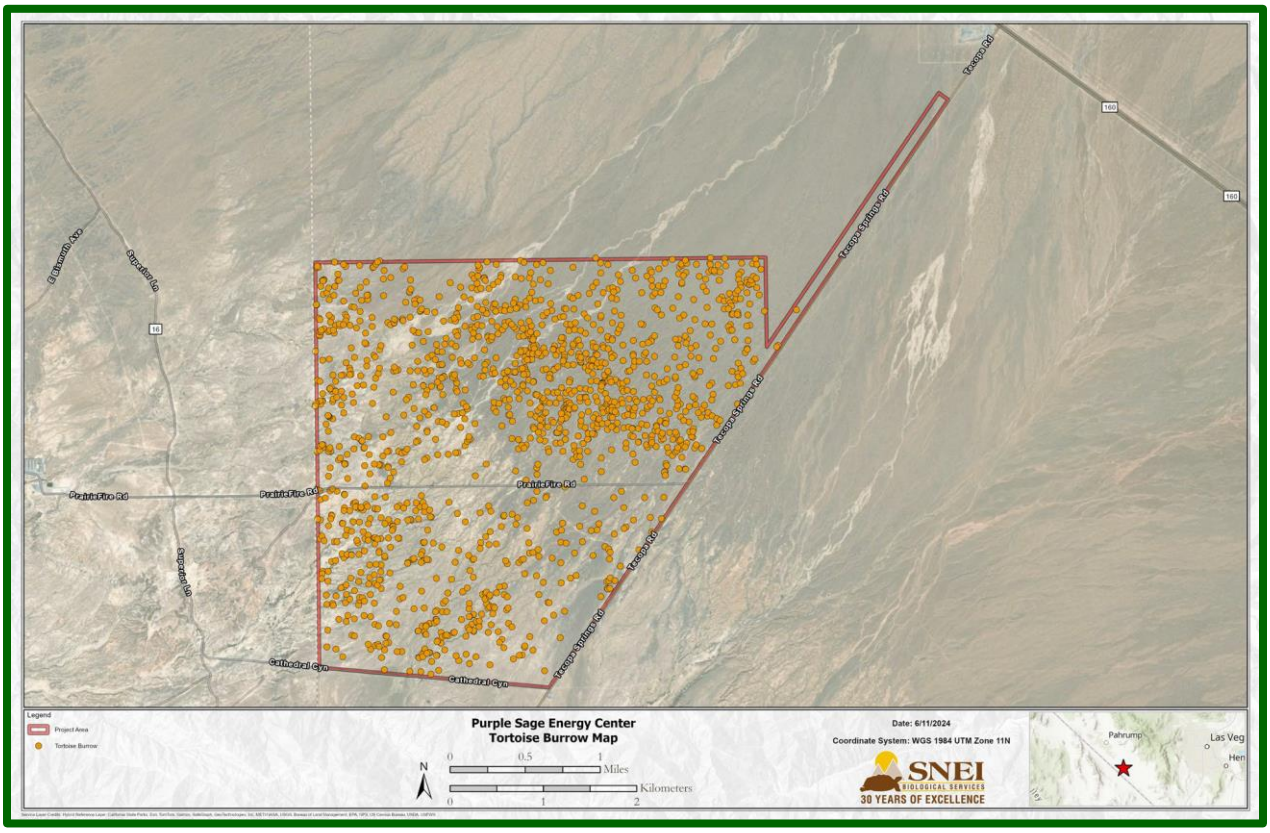


Figure 6. Purple Sage Energy Center Project Desert Tortoise Burrow Map.

Third, BLM's mitigation measure to retain tortoise burrows indicates that BLM intends for the tortoise to reuse the project site following completion of the construction phase. As mentioned earlier in our comments on page 2-12, "Wildlife Access," we found conflicting information in the DEIS on whether reoccupation of the project site by the tortoise would or would not occur.

Fourth, because of the large number of tortoise burrows found on the project site, the Council asks why wildlife detection dogs are not being used to determine the presence of tortoises and ensure that all the tortoise on the project site are located so they will not be harmed, injured or killed during construction activities. Cablk and Heaton (2006) reported that humans "almost never locate neonate or juvenile tortoises in surveys" and trained detection dogs "found smaller tortoises (30–280 mm) than did humans (110–280 mm)." In addition, tortoises in intact and collapsed burrows typically go undetected by humans conducting clearance surveys. Detection dogs had more than a 90 percent accuracy in detecting tortoises in burrows. Bjurlin et al. (2004) reported that wildlife detection dogs are able to locate live Mojave desert tortoises that are buried (e.g., in collapsed burrows) and whose presence was confirmed after excavating the burrow and for small tortoises that typically go undetected (Bjurlin et al. 2004). If BLM is committed to finding all tortoises on the project site and translocating them, BLM may suggest the use of wildlife detection dogs trained to find Mojave desert tortoises in addition to authorized biologists and monitors to ensure that smaller tortoises are located. Please address this issue in the Final EIS.

Comments on Appendix E: Literature Cited and Preparers

For Wildlife, Migratory Birds, and Other Special Status Wildlife and for Threatened and Endangered Species, BLM cites their Special Status Species Management – Manual 6840 released in 2008. We request that BLM use and comply with BLM's Special Status Species Management – 6840 released in 2024. This updated policy establishes an agency-wide emphasis on proactive, landscape- and ecosystem-level, scientifically informed conservation and recovery of special status species and their habitats. It directs BLM to:

- Comply with FESA Section 7(a)(2) consultation regulations and incorporate proactive recovery efforts into proposed actions;
- promote healthy species populations and biodiversity through landscape- and ecosystem-level management; and
- use science and adaptive management to advance conservation and recovery.

We request that BLM describe the proactive conservation efforts it is requiring of the Applicant to contribute to the recovery of the tortoise, in addition to the mitigation BLM is requiring to replace the loss and degradation of tortoise habitat, including the temporal loss of habitat, demonstrate how it is promoting healthy populations of tortoises in the Eastern Mojave Recovery Unit, and using science to advance the conservation and recovery of the tortoise in this recovery unit.

Comments on Purple Sage Energy Center Project Alternatives Report N-100225

This report is not a BLM document but much of the information in it appears to have been adopted in writing some of the chapters of the DEIS. Throughout this alternatives report, the authors have drawn numerous conclusions about the effects of the alternatives on the resource issues. However, we were unable to find references from the scientific literature that supported these conclusions. Lacking this support, the conclusions in the document appear to be based on opinions and not on facts.

Comments on the Draft Restoration & Decommissioning Plan

The Council appreciates that BLM has included this Draft Restoration and Decommissioning Plan (restoration plan) in the documents provide for public review for the project. On page 5 of this restoration plan, BLM says that the level of disturbance to vegetation from accessing panel arrays using rubber-tired or rubber-tracked vehicles (tractors, side-by-sides, forklifts); during construction would result in vegetation being crushed; "it survives and regrows and the seedbank is left in place." Slade (2023) reported that this site preparation method was used in the southern California desert at a solar facility. However, the environment at this solar facility with panels that track the sun was still "largely devoid of plant life more than 2 years post-construction."

We request that BLM provide documentation from the scientific literature that demonstrates that native perennial woody and herbaceous vegetation would survive and regrow within a short period of time following the construction phase such that the wildlife in the area would be able to reoccupy the site shortly after construction is completed.

BLM claims that the long-term direct impacts from the project footprint would affect 762 acres and temporary direct impacts would affect 749 acres. We found no mention of the indirect impacts to vegetation from the construction, operation and maintenance, and decommissioning of the project. As provided above, indirect impacts are likely to occur to down-gradient soils and vegetation from the alteration of surface hydrology and soil moisture caused by construction of the project. Utility-scale solar energy projects also raise the ground and ambient temperatures in the first 200–400 meters (656 to 1,312 feet) off the project site. This rise in temperature also impacts the availability of soil moisture (Devitt et al. 2022). Both of these impacts would reduce the survival, reproduction, and recruitment of native annual and perennial vegetation.

In viewing the location of the solar facilities within the project boundary, most of the facilities are located in the up-gradient portion of the project site with the down-gradient portion within the project boundary devoid of facilities. While not experiencing direct disturbance from project construction, operations and maintenance, and decommissioning, these down-gradient locations in the project site would experience indirect impacts from the solar project including indirect impacts to soils and vegetation from the heat island effect and alteration of surface hydrology and soil moisture. Consequently, when calculating the impacts of the project to vegetation and soils, the likely indirect impacts should also be included in these tables. Please add this information to the restoration plan.

“This plan defines four levels of restoration effort required (R1 - R4) and is based on the following land management designations: 1) R1: National Conservation Areas, 2) R2: High Priority Recovery Areas, 3) R3: Medium Priority Recovery Areas, 4) R4: Multiple Use Managed Areas.” “Restoration will be considered successful if identified measures of native perennial vegetation is equal to or exceeds a designated percentage of the values for these parameters in undisturbed reference areas. The standards required for the four land management designations are: 100 % for R1, 80% for R2, 70% for R3, and 60% for R4.”

The Council requests that BLM explain why for some public lands, undue degradation is not allowed and the required level of restoration effort is 100% (e.g., National Conservation Areas), while for other public lands undue degradation of lesser amounts is acceptable. Our understanding is that FLPMA requires BLM to take any action necessary to prevent unnecessary or undue degradation of ALL public lands managed by the BLM. Consequently, we believe that the Applicant should be required to meet the 100% designation for restoration and BLM should revise its “standard” to comply with FLPMA.

Under “3.1. Pre-construction Actions,” we found no requirement to document the site’s conditions before construction is initiated. This documentation should include plant community measurements and photographs of sites that are to be restored post-construction and after decommissioning. Aerial photography of the entire project site should be taken such that the species of woody perennials can be identified as well as their distribution, density, and cover. Photographs from the ground, especially looking upgradient will document the locations and depths of small washes and other drainages that should be restored.

Under the “Post-Construction Actions” section, which includes the implementation of soils and vegetation activities, we found no requirement to inoculate soils to establish mycorrhizal native species/soil crusts that have been shown to increase plant growth of Mojave Desert plant species

(Chiquoine et al. 2016, Hernandez et al. 2023). To increase the likelihood of success the restoration plan should include the latest information from the scientific literature on restoration of vegetation in the Mojave Desert from the scientific literature (e.g., Abella et al. 2015, Abella and Berry 2016, Abella et al. 2023, etc.) if BLM wants these restoration efforts to be successful.

Restoration should include establishing annual native vegetation with a diversity of these species. Many wildlife species that are lower on the food web derive their water and nutrients from herbaceous annuals. To assist in this effort, the Council suggests using a plant pallet and method for selection of appropriate plant species (Esque et al. 2021, Shyrock et al. 2022, etc.).

"All Restoration Areas will have signs installed at regular intervals to deter vehicular damage to the site. If OHV incursions occur at a rate higher than five per month, additional fencing and signage will be added." Installing signs would provide additional perch site for ravens. BLM should have data on whether installing signs that can be seen at a distance attracts OHV users to the site versus the effectiveness of the signs in keeping people from driving onto the site and damaging the restoration work. BLM should use these data to determine whether these signs are effective in preventing these restoration areas from human use or attract human use. If BLM does not have these data, the Applicant should be required to implement and monitor this study.

Further, we question BLM's categorization of the project area as a multiple use managed area. We suspect, this designation is in the outdated 1998 RMP and that the RMP did not identify this portion of the Pahrump Valley as a Priority 2 Connectivity Area for the tortoise. Since the RMP was adopted 27 years ago, a substantial decline in tortoise densities and numbers in the Eastern Mojave Recovery Unit has occurred and the impacts of climate change that exacerbate a multitude of anthropogenic impacts to the tortoise and tortoise habitat have been documented. Consequently, we assert that this area is a high priority area for tortoises given the numbers of tortoises found during tortoise surveys (and the high number found at the adjacent Yellow Pine Solar site) and the importance of the valleys in southwestern Nevada in providing tortoise habitat/connectivity as tortoise habitat shifts north in the future (Parandhaman 2023). Additionally, research by Berry et al. (2014) showed that in an area designated as desert tortoise critical habitat, BLM's management of "actions which reduce human impacts to the landscape for the purposes of recovery of federally-listed or special-status species (e.g., Mojave desert tortoise) is not working and tortoise numbers, densities, and recruitment continue to decline." Again, we request that BLM provide citations from the scientific literature to support these restoration designations. Without such documentation, they appear to be arbitrary.

In reading the "Maintenance" section of the restoration plan, we were unable to find information on quantities or frequencies of actions to be implemented. For example, there is a short section that says, "4.1.3 Removing trash. The ROW will be kept free of trash, which can contain weeds and can lead to more disturbance." Is this trash collecting activity conducted once a week, once a month, once a year, immediately after a windy day? How is it conducted? If a vehicle is used, is the vehicle required to stay on designated roads? Similarly, there are some sections that contain only the heading of the section with no instructions, such as section "4.1.4. Repairing fencing/installing boulders to prevent intrusions," which has no activities listed after this heading. Thus, we conclude this draft plan was not finished before releasing it to the public for review.

Under “Post-Construction Actions, Reporting,” we found no requirement to provide photography of what the project site looks like after implementation of the project. These photographs should be taken at the same location as the photographs that documented the site’s conditions before construction was initiated. These after-construction photographs will help to document the changes in soils and vegetation that occurred during the post-construction and implementation restoration actions period. Please add this requirement to the plan.

Because there is missing information from this draft plan and because we were unable to find references to scientific literature that supports the identified actions, we consider it to be an incomplete plan rather than a draft plan. BLM should complete the plan and document that it complies with the BLM’s Mitigation Policy, Handbook, and Manual (BLM 2021a, 2021b, 2021c) that requires information such as quantities and frequencies and that the plan has been created using the best available current scientific information to assure the greatest success from implementation of the plan. Please complete this plan and include it as an appendix to the Final EIS.

Under “Monitoring and Reporting,” the As-Built Report does not require the Applicant to describe the methods used for achieving restoration and why they were used. Please require this information in the reporting requirements.

Under “Minimum Monitoring Time Period,” BLM provides a table of the length of time that the Applicant would monitor the vegetation restoration. Abella (2010) reported that the regeneration times for native vegetation for cover takes on average 76 years while return to species composition is an estimated 215 years. We expect that this time would be reduced because of activities conducted by the Applicant to assist the restoration process. However, the monitoring times that BLM is requiring in this plan are unsupported by references provided in this plan. We conclude that BLM arbitrarily selected these monitoring times. Please provide documentation from the scientific literature that these monitoring times are sufficient to ensure that native plants species cover, density, and composition are restored.

Under “Qualitative Monitoring,” the Applicant, not BLM should conduct all required monitoring in this plan. Our concern is that BLM does not have the resources to conduct this monitoring and it should be the Applicant’s responsibility because the Applicant is causing the damage/loss to soils, vegetation, and wildlife habitat on public lands.

Under “Quantitative Monitoring,” BLM states “Quantitative monitoring is used to objectively determine when a disturbed site has progressed sufficiently towards recovery of the natural ecosystem structure and function and that it will continue to progress towards a self-sustaining system, such that the Applicant can be released from responsibility.” Here BLM recognizes that the purpose of restoration is recovery of natural ecosystem structure and function. Restoration of the ecosystem includes surface hydrology, the biotic and abiotic components of the soils, native annual and perennial plants, wildlife, and their interrelationships. It also includes the areas indirectly impacted by the project (e.g., areas down-gradient that had surface flow reduced or eliminated and adversely affecting soils, vegetation, and wildlife. These areas should also be restored. In addition, if the restoration is not successful, the Applicant should be required to implement the restoration efforts until they are successful. Because of the temporal loss of the ecosystem’s structure and function, the Applicant should be required to mitigate this temporal loss through additional compensation implemented as off-site mitigation. This site should be managed as a natural ecosystem, not for multiple use. Please include these requirements in the restoration plan.

“Measurements for annual natives will be compared to measurements made from nearby, undisturbed reference areas because variation in growth of annual plants can be substantial between years.” This is the only place in the restoration plan where native annuals are mentioned. Later in this section, biocrust cover and richness is listed as a standard. This is the only place we found biocrusts mentioned in the restoration plan. Please include this information earlier in the restoration plan and in the DEIS.

Under “Success Standards,” BLM states, “Restoration will be considered successful if plant cover, density, and species richness of native perennial vegetation is equal to or exceeds a designated percentage of the values for these parameters in undisturbed reference areas.” In the DEIS, BLM only requires that cover equal or exceed the designated percentage. Please correct the information the DEIS and other appendices to reflect that plant cover, density and species richness of native perennial vegetation are requirements for success.

“Any outplanted or transplanted shrubs will need to show survival over 1 full year without watering to get an accurate assessment of survivability.” We request that BLM provide references from the scientific literature that a 1-year monitoring period is adequate to determine survival for out-planted or transplanted shrubs.

Please see our comments above concerning BLM’s determination that a 60% success standard is scientifically acceptable for this restoration plan.

Under “Post-Decommissioning Restoration,” please add that biocrusts will also be monitored as described in Section 5 to ensure that revegetation efforts are successful.

Under “Performance Bond,” BLM requires that this bond be posted prior to the initiation of construction and that it is “structured in such a manner that BLM will be able to access those funds to pay for the decommissioning and restoration of the site, in the event that the project owner becomes insolvent.” We were unable to find information on how BLM will calculate the amount of this performance bond when most of the work that the Applicant is required to conduct, decommissioning and restoration, will not occur for more than 30 years. We are aware of situations on BLM land where applicants have obtained a ROW or lease, posted a bond, conducted their work, and abandoned the site because the cost of restoration was greater than the amount of the bond that BLM required. This resulted in these sites not being restored to their required condition because the bond that was required was inadequate. Please provide this information in the restoration plan and assurances that the bond would be adequate to cover the restoration, monitoring, and adaptive management costs if the Applicant is unable to implement the restoration.

In Appendix C, BLM-Approved Dust Palliatives/Soil Binders of the restoration plan, please ensure that this information in included in the formal Section 7 consultation with the USFWS for any areas that may be used by tortoises after construction.

In summary, (1) the alteration of surface hydrology and its deleterious impacts on downgradient soil moisture, vegetation, and habitat for the tortoise; (2) the heat island effect that includes increased daytime temperatures, including shade temperatures, and nighttime temperatures at the location of the solar arrays and nearby areas and their deleterious impacts on the tortoise for survival, reproduction, and growth; (3) the impacts of surface disturbance, combined with

increased heat, disruption of surface hydrology on the survival of native annual vegetation required by the tortoise for survival, reproduction, and growth to the project site and to adjacent and downgradient areas; and (4) the cumulative impacts of development and surface disturbance that is present and reasonably expected to occur in the Pahrump Valley and adjacent areas in the future including nine utility-scale solar projects grouped in high quality tortoise habitat with high densities of tortoises when compared to other populations throughout the species' range – these impacts when compared to the needs of the tortoise populations to connect the populations in the Northeastern Mojave Recovery Unit to the those in the Eastern Mojave Recovery Unit – indicate that the anticipated passive reoccupation of the project site would not occur and the project site will not provide functioning linkage habitat for the tortoise that has recently been identified as important to tortoise survival.

When these impacts and analyses are combined with cumulative impacts to the tortoise and tortoise habitat including impacts from existing developments and activities, both authorized and unauthorized, reasonably foreseeable future projects, and climate change, the likelihood that the Pahrump Valley would provide effective linkage habitat for the tortoise and connectivity between the Eastern and Northeastern Mojave Recovery Units is substantially diminished and may be halted.

The mitigation that BLM discusses in the DEIS and associated documents does not fully offset the impacts to the tortoise. Compensating for the loss/degradation of thousands of acres tortoise habitat is not required. No designation of the area east of Nevada Highway 160 as a Priority Connectivity Area is proposed to manage it for the tortoise and exclude development and activities that adversely impact the tortoise.

Rather than approving projects in tortoise habitat, especially lands with tortoise densities above the minimum viability threshold, BLM should approve projects located outside of occupied tortoise habitat, critical habitat, and habitat needed for population connectivity and movement in response to climate change. BLM should treat requests for ACEC designations at the same level of importance as applications for ROWs. Because of BLM's recent adoption of regulations to treat wildlife habitat as a use, BLM should revise its regulations so that all uses are treated the same in the regulations. Therefore, requests for ACECs, should be treated equally with requests for ROWs, leases, etc. They should be analyzed in BLM NEPA documents and not dismissed in subsequent, specific project NEPA documents such as this one.

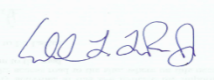
Consequently, the Council strongly requests that BLM withdraw the Purple Sage Energy Center solar project from further consideration. In addition, any other actions subject to BLM approval in the Pahrump Valley and Amargosa Valley should be paused until BLM establishes an effective network of linkage habitats throughout these valleys to connect tortoise populations within the Eastern Mojave Recovery Unit and with adjacent Recovery Units and until which time the 1998 Las Vegas RMP is substantially revised using current scientific information.

We remind BLM that it is directed under the FESA to implement actions that contribute to the conservation/recovery of the tortoise and not implement actions that only minimize impacts. Minimizing impacts does not contribute to the conservation and recovery of the tortoise. It slows the rate of extirpation.

We appreciate this opportunity to provide the above comments and trust they will help protect tortoises during any resulting authorized activities. Herein, we reiterate that the Council wants to be identified as an Affected Interest for this and all other projects funded, authorized, or carried out by the BLM that may affect desert tortoises, and that any subsequent environmental documentation for this project is provided to us at the contact information listed above. Additionally, we ask that you notify the Desert Tortoise Council at eac@deserttortoise.org of any proposed projects that BLM may authorize, fund, or carry out in the range of any species of desert tortoise in the southwestern United States (i.e., *Gopherus agassizii*, *G. morafkai*, *G. berlandieri*, *G. flavomarginatus*) so we may comment on it to ensure BLM fully considers actions to conserve these tortoises as part of its directive to conserve biodiversity on public lands managed by BLM.

Please respond in an email that you have received this comment letter so we can be sure our concerns have been registered with the appropriate personnel and office for this project.

Respectfully,



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Attachment A. Demographic Status and Trend of the Mojave Desert Tortoise (*Gopherus agassizii*) including the Eastern Mojave Recovery Unit

To assist the Agencies with their analysis of the direct, indirect, and cumulative impacts of the Proposed Project on the Mojave desert tortoise, we provide the following information on its status and trend. In reviewing the data presented below, note that the location of the proposed project is within the Colorado Desert Recovery Unit, which has experienced a decline in tortoise density and abundance of –36%, since 2004.

The Desert Tortoise Council (Council) has serious concerns about direct, indirect, and cumulative sources of human mortality for the Mojave desert tortoise given the status and trend of the species range-wide, within each of the five recovery units, and within the Tortoise Conservation Areas (TCAs) that comprise each recovery unit.

Below are tables with data on changes to Mojave desert tortoise densities and abundance since 2004. Important points from these tables include the following:

Change in Status for the Mojave Desert Tortoise Range-wide
● Ten of 17 populations of the Mojave desert tortoise declined from 2004 to 2014.

● Eleven of 17 populations of the Mojave desert tortoise are below the population viability threshold trough 2021. These 11 populations represent 89.7 percent of the range-wide habitat in CHUs/TCAs.

Change is Status for the Eastern Mojave Recovery Unit – Nevada and California
● This recovery unit had a 67 percent decline in tortoise density from 2004 to 2014, the highest rate of decline of the five recovery units.

● All tortoise populations in this recovery unit have densities that are below the viability level established by the USFWS (1994a).

● The Eastern Mojave Recovery Unit provides population and habitat connectivity between the Western Mojave and Colorado Desert recovery units and the Northeastern and Upper Virgin River recovery units. Continued development that fragments tortoise populations and habitats eventually severs the genetic connection between the two recovery units to the west and two to the east.

Densities of Adult Mojave Desert Tortoises: A few years after listing the Mojave desert tortoise under the FESA, the USFWS published a Recovery Plan for the Mojave desert tortoise (USFWS 1994a). It contained a detailed population viability analysis. In this analysis, the minimum viable density of a Mojave desert tortoise population is 10 adult tortoises per mile^2 (3.9 adult tortoises per km^2). This assumed a male-female ratio of 1:1 (USFWS 1994a, page C25) and certain areas of habitat with most of these areas geographically linked by adjacent borders or corridors of suitable tortoise habitat. Populations of Mojave desert tortoises with densities below this density are in danger of extinction (USFWS 1994a, page 32). The revised recovery plan (USFWS 2011) designated five recovery units for the Mojave desert tortoise that are intended to conserve the

genetic, behavioral, and morphological diversity necessary for the recovery of the entire listed species (Allison and McLuckie 2018).

Range-wide, densities of adult Mojave desert tortoises declined more than 32% between 2004 and 2014 (Table 1) (USFWS 2015). At the recovery unit level, between 2004 and 2014, densities of adult desert tortoises declined, on average, in every recovery unit except the Northeastern Mojave (Table 1). Adult densities in the Northeastern Mojave Recovery Unit increased 3.1% per year (SE = 4.3%), while the other four recovery units declined at different annual rates: Colorado Desert (–4.5%, SE = 2.8%), Upper Virgin River (–3.2%, SE = 2.0%), Eastern Mojave (–11.2%, SE = 5.0%), and Western Mojave (–7.1%, SE = 3.3%)(Allison and McLuckie 2018). However, the small area and low starting density of the tortoises in the Northeastern Mojave Recovery Unit (lowest density of all Recovery Units) resulted in a small overall increase in the number of adult tortoises by 2014 (Allison and McLuckie 2018). In contrast, the much larger areas of the Eastern Mojave, Western Mojave, and Colorado Desert recovery units, plus the higher estimated initial densities in these areas, explained much of the estimated total loss of adult tortoises since 2004 (Allison and McLuckie 2018).

At the population level, represented by tortoises in the TCAs, densities of 10 of 17 monitored populations of the Mojave desert tortoise declined from 26% to 64% and 11 have densities less than 3.9 adult tortoises per km^2 (USFWS 2015).

Population Data on Mojave Desert Tortoise: The Mojave desert tortoise was listed as threatened under the FESA in 1990. The listing was warranted because of ongoing population declines throughout the range of the tortoise from multiple human-caused activities. Since the listing, the status of the species has changed. Population numbers (abundance) and densities continue to decline substantially (please see Tables 1 and 2).

Table 1. Summary of 10-year trend data for 5 Recovery Units and 17 Critical Habitat Units (CHU)/Tortoise Conservation Areas (TCA) for the Mojave desert tortoise, *Gopherus agassizii* (=Agassiz's desert tortoise). The table includes the area of each Recovery Unit and Critical Habitat Unit (CHU)/Tortoise Conservation Area (TCA), percent of total habitat for each Recovery Unit and Critical Habitat Unit/Tortoise Conservation Areas, density (number of breeding adults/km^2 and standard errors = SE), and the percent change in population density between 2004-2014. Populations below the viable level of 3.9 adults/km^2 (10 adults per mi^2) (assumes a 1:1 sex ratio) and showing a decline from 2004 to 2014 are in red (Allison and McLuckie 2018, USFWS 2015).

Recovery Unit Designated Critical Habitat Unit/Tortoise Conservation Area	Surveyed area (km^2)	% of total habitat area in Recovery Unit & CHU/TCA	2014 density/km^2 (SE)	% 10-year change (2004–2014)
Western Mojave, CA	**6,294**	**24.51**	**2.8 (1.0)**	**–50.7 decline**
Fremont-Kramer	2,347	9.14	2.6 (1.0)	–50.6 decline
Ord-Rodman	852	3.32	3.6 (1.4)	–56.5 decline
Superior-Cronese	3,094	12.05	2.4 (0.9)	–61.5 decline
Colorado Desert, CA	**11,663**	**45.42**	**4.0 (1.4)**	**–36.25 decline**
Chocolate Mtn AGR, CA	713	2.78	7.2 (2.8)	–29.77 decline
Chuckwalla, CA	2,818	10.97	3.3 (1.3)	–37.43 decline

Chemehuevi, CA	3,763	14.65	2.8 (1.1)	–64.70 decline
Fenner, CA	1,782	6.94	4.8 (1.9)	–52.86 decline
Joshua Tree, CA	1,152	4.49	3.7 (1.5)	+178.62 increase
Pinto Mtn, CA	508	1.98	2.4 (1.0)	–60.30 decline
Piute Valley, NV	927	3.61	5.3 (2.1)	+162.36 increase
Northeastern Mojave	**4,160**	**16.2**	**4.5 (1.9)**	**+325.62 increase**
Beaver Dam Slope, NV, UT, AZ	750	2.92	6.2 (2.4)	+370.33 increase
Coyote Spring, NV	960	3.74	4.0 (1.6)	+ 265.06 increase
Gold Butte, NV & AZ	1,607	6.26	2.7 (1.0)	+ 384.37 increase
Mormon Mesa, NV	844	3.29	6.4 (2.5)	+ 217.80 increase
Eastern Mojave, NV & CA	**3,446**	**13.42**	**1.9 (0.7)**	**–67.26 decline**
El Dorado Valley, NV	999	3.89	1.5 (0.6)	–61.14 decline
Ivanpah, CA	2,447	9.53	2.3 (0.9)	–56.05 decline
Upper Virgin River	**115**	**0.45**	**15.3 (6.0)**	**–26.57 decline**
Red Cliffs Desert	115	0.45	15.3 (6.0)	–26.57 decline
Total amount of land	**25,678**	**100.00**		**–32.18 decline**

Density of Juvenile Mojave Desert Tortoises: Survey results indicate that the proportion of juvenile desert tortoises has been decreasing in all five recovery units since 2007 (Allison and McLuckie 2018). The probability of encountering a juvenile tortoise was consistently lowest in the Western Mojave Recovery Unit. Allison and McLuckie (2018) provided reasons for the decline in juvenile desert tortoises in all recovery units. These included decreased food availability for adult female tortoises resulting in reduced clutch size, decreased food availability resulting in increased mortality of juvenile tortoises, prey switching by coyotes from mammals to tortoises, and increased abundance of common ravens that typically prey on smaller desert tortoises.

Declining adult tortoise densities through 2014 have left the Eastern Mojave Desert adult numbers at 64% (Allison and McLuckie 2018, USFWS 2015). Such steep declines in the density of adults are only sustainable if there are suitably large improvements in reproduction and juvenile growth and survival. However, the proportion of juveniles has not increased anywhere in the range of the Mojave desert tortoise since 2007 (Allison and McLuckie 2018).

The USFWS and Utah Division of Wildlife Resources have continued to collect density data on the Mojave desert tortoise since 2014. The results are provided in Table 2 along with the analysis USFWS (2015) conducted for tortoise density data from 2004 through 2014. These data show that adult tortoise densities in most Recovery Units continued to decline in density since the data collection methodology was initiated in 2004. In addition, in the Northeastern Mojave Recovery Unit that had shown an overall increase in tortoise density between 2004 and 2014, subsequent data indicate a decline in density since 2014 (USFWS 2016, 2018, 2019, 2020, 2022a, 2022b).

Abundance of Mojave Desert Tortoises: Allison and McLuckie (2018) noted that because the area available to tortoises (i.e., tortoise habitat and linkage areas between habitats) is decreasing, trends in tortoise density no longer capture the magnitude of decreases in abundance. Hence, they reported on the change in abundance or numbers of the Mojave desert tortoise in each recovery unit (Table 2). They noted that these estimates in abundance are likely higher than actual numbers of tortoises, and the changes in abundance (i.e., decrease in numbers) are likely lower than actual numbers because of their habitat calculation method. They used area estimates that removed only

impervious surfaces created by development as cities in the desert expanded. They did not consider degradation and loss of habitat from other sources, such as the recent expansion of military operations (753.4 km2 so far on Fort Irwin and the Marine Corps Air Ground Combat Center), intense or large scale fires (e.g., 576.2 km2 of critical habitat that burned in 2005), development of utility-scale solar facilities (as of 2015, 194 km2 have been permitted) (USFWS 2016), or other sources of degradation or loss of habitat (e.g., recreation, mining, grazing, infrastructure, etc.). Thus, the declines in abundance of Mojave desert tortoise are likely greater than those reported in Table 3.

Habitat Availability: Data on population density or abundance does not indicate population viability. The area of protected habitat or reserves for the subject species is a crucial part of the viability analysis along with data on density, abundance, and other population parameters. In the Desert Tortoise (Mojave Population) Recovery Plan (USFWS 1994a), the analysis of population viability included population density and size of reserves (i.e., areas managed for the desert tortoise) and population numbers (abundance) and size of reserves. The USFWS Recovery Plan reported that as population densities for the Mojave desert tortoise decline, reserve sizes must increase, and as population numbers (abundance) for the Mojave desert tortoise decline, reserve sizes must increase (USFWS 1994a). In 1994, reserve design (USFWS 1994a) and designation of critical habitat (USFWS 1994b) were based on the population viability analysis from numbers (abundance) and densities of populations of the Mojave desert tortoise in the early 1990s. Inherent in this analysis is that the lands be managed with reserve level protection (USFWS 1994a, page 36) or ecosystem protection as described in section 2(b) of the FESA, and that sources of mortality be reduced so recruitment exceeds mortality (that is, lambda > 1)(USFWS 1994a, page C46).

Table 2. Summary of data for Agassiz's desert tortoise, *Gopherus agassizii* (=Mojave desert tortoise) from 2004 to 2021 for the 5 Recovery Units and 17 Critical Habitat Units (CHUs)/Tortoise Conservation Areas (TCAs). The table includes the area of each Recovery Unit and CHU/TCA, percent of total habitat for each Recovery Unit and CHU/TCA, density (number of breeding adults/km^2 and standard errors = SE), and percent change in population density between 2004-2014 (USFWS 2015). Populations below the viable level of 3.9 breeding individuals/km^2 (10 breeding individuals per mi^2) (assumes a 1:1 sex ratio) (USFWS 1994a, 2015) or showing a decline from 2004 to 2014 are in **red.**

Recovery Unit: Designated CHU/TCA &	**% of total habitat area in Recovery Unit & CHU/TCA**	**2004 density/ km^2**	**2014 density/ km^2 (SE)**	**% 10-year change (2004–2014)**	**2015 density/ km^2**	**2016 density/ km^2**	**2017 density/ km^2**	**2018 density/ km^2**	**2019 density/ km^2**	**2020 density/ km^2**	**2021 density/ km^2**
Western Mojave, CA	**24.51**		**2.8 (1.0)**	**–50.7 decline**							
Fremont-Kramer	9.14		2.6 (1.0)	–50.6 decline	4.5	No data	4.1	No data	2.7	1.7	No data
Ord-Rodman	3.32		3.6 (1.4)	–56.5 decline	No data	No data	3.9	2.5/3.4*	2.1/2.5*	No data	1.9/2.5*
Superior-Cronese	12.05		2.4 (0.9)	–61.5 decline	2.6	3.6	1.7	No data	1.9	No data	No data
Colorado Desert, CA	**45.42**		**4.0 (1.4)**	**–36.25 decline**							
Chocolate Mtn AGR, CA	2.78		7.2 (2.8)	–29.77 decline	10.3	8.5	9.4	7.6	7.0	7.1	3.9
Chuckwalla, CA	10.97		3.3 (1.3)	–37.43 decline	No data	No data	4.3	No data	1.8	4.6	2.6
Chemehuevi, CA	14.65		2.8 (1.1)	–64.70 decline	No data	1.7	No data	2.9	No data	4.0	No data
Fenner, CA	6.94		4.8 (1.9)	–52.86 decline	No data	5.5	No data	6.0	2.8	No data	5.3
Joshua Tree, CA	4.49		3.7 (1.5)	+178.62 increase	No data	2.6	3.6	No data	3.1	3.9	No data
Pinto Mtn, CA	1.98		2.4 (1.0)	–60.30 decline	No data	2.1	2.3	No data	1.7	2.9	No data
Piute Valley, NV	3.61		5.3 (2.1)	+162.36 increase	No data	4.0	5.9	No data	No data	No data	3.9

Recovery Unit: Designated CHU/TCA	% of total habitat area in Recovery Unit & CHU/TCA	2004 density/ km^2	2014 density/km^2 (SE)	% 10-year change (2004–2014)	2015	2016	2017	2018	2019	2020	2021
Northeastern Mojave AZ, NV, & UT	**16.2**		**4.5 (1.9)**	**+325.62 increase**							
Beaver Dam Slope, NV, UT, & AZ	2.92		6.2 (2.4)	+370.33 increase	No data	5.6	1.3	5.1	2.0	No data	No data
Coyote Spring, NV	3.74		4.0 (1.6)	+ 265.06 increase	No data	4.2	No data	No data	3.2	No data	No data
Gold Butte, NV & AZ	6.26		2.7 (1.0)	+ 384.37 increase	No data	No data	1.9	2.3	No data	No data	2.4
Mormon Mesa, NV	3.29		6.4 (2.5)	+ 217.80 increase	No data	2.1	No data	3.6	No data	5.2	5.2
Eastern Mojave, NV & CA	**13.42**		**1.9 (0.7)**	**–67.26 decline**							
El Dorado Valley, NV	3.89		1.5 (0.6)	–61.14 decline	No data	2.7	5.6	No data	2.3	No data	No data
Ivanpah Valley, CA	9.53		2.3 (0.9)	–56.05 decline	1.9	No data	No data	3.7	2.6	No data	1.8
Upper Virgin River, UT & AZ	**0.45**		**15.3 (6.0)**	**–26.57 decline**							
Red Cliffs Desert**	0.45	29.1 (21.4-39.6)**	15.3 (6.0)	–26.57 decline	15.0	No data	19.1	No data	17.2	No data	
Range-wide Area of CHUs - TCAs/Range-wide Change in Population Status	**100.00**			**–32.18 decline**							

* This density includes the adult tortoises translocated from the expansion of the MCAGCC, that is resident adult tortoises and translocated adult tortoises.

**Methodology for collecting density data initiated in 1999.

Table 3. Estimated change in abundance of adult Mojave desert tortoises in each recovery unit between 2004 and 2014 (Allison and McLuckie 2018). Decreases in abundance are in red.

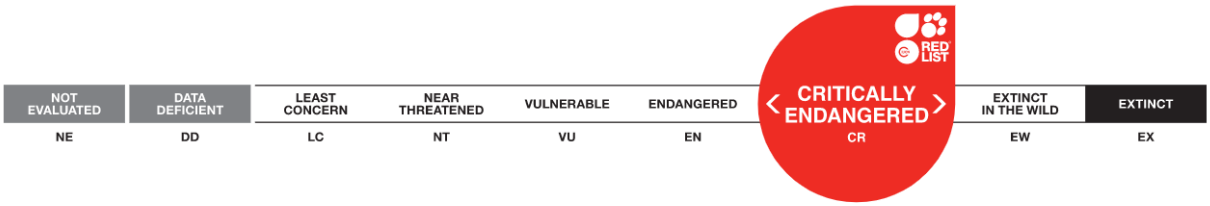
Recovery Unit	Modeled Habitat (km^2)	2004 Abundance	2014 Abundance	Change in Abundance	Percent Change in Abundance
Western Mojave	23,139	131,540	64,871	-66,668	-51%
Colorado Desert	18,024	103,675	66,097	-37,578	-36%
Northeastern Mojave	10,664	12,610	46,701	34,091	270%
Eastern Mojave	16,061	75,342	24,664	-50,679	-67%
Upper Virgin River	613	13,226	10,010	-3,216	-24%
Total	**68,501**	**336,393**	**212,343**	**-124,050**	**-37%**

Habitat loss would also disrupt the prevailing population structure of this widely distributed species with geographically limited dispersal (isolation by resistance Dutcher et al. 2020). Allison and McLuckie (2018) anticipate an additional impact of this habitat loss/degradation is decreasing resilience of local tortoise populations by reducing demographic connections to neighboring populations (Fahrig 2007). Military and commercial operations and infrastructure projects that reduce tortoise habitat in the desert are anticipated to continue (Allison and McLuckie 2018) as are other sources of habitat loss/degradation.

Allison and McLuckie (2018) reported that the life history of the Mojave desert tortoise puts it at greater risk from even slightly elevated adult mortality (Congdon et al. 1993; Doak et al. 1994), and recovery from population declines will require more than enhancing adult survivorship (Spencer et al. 2017). The negative population trends in most of the TCAs for the Mojave desert tortoise indicate that this species is on the path to extinction under current conditions (Allison and McLuckie 2018). They state that their results are a call to action to remove ongoing threats to tortoises from TCAs, and possibly to contemplate the role of human activities outside TCAs and their impact on tortoise populations inside them.

Densities, numbers, and habitat for the Mojave desert tortoise declined between 2004 and 2014 and densities continue to decline in most Recovery Units since 2014. As reported in the population viability analysis, to improve the status of the Mojave desert tortoise, reserves (area of protected habitat) must be established and managed. When densities of tortoises decline, the area of protected habitat must increase. When the abundance of tortoises declines, the area of protected habitat must increase. We note that the Desert Tortoise (Mojave Population) Recovery Plan was released in 1994 and its report on population viability and reserve design was reiterated in the 2011 Revised Recovery Plan as needing to be updated with current population data (USFWS 2011, p. 83). With lower population densities and abundance, a revised population viability analysis would show the need for greater areas of habitat to receive reserve level of management for the Mojave desert tortoise. In addition, we note that none of the recovery actions that are fundamental tenets of conservation biology has been implemented throughout most or all of the range of the Mojave desert tortoise.

IUCN Species Survival Commission: The Mojave desert tortoise is now on the list of the world's most endangered tortoises and freshwater turtles. It is in the top 50 species. The International Union for Conservation of Nature's (IUCN) Species Survival Commission, Tortoise and Freshwater Turtle Specialist Group, now considers Mojave desert tortoise to be Critically Endangered (Berry et al. 2021). As such, it is a "species that possess an extremely high risk of extinction as a result of rapid population declines of 80 to more than 90 percent over the previous 10 years (or three generations), a current population size of fewer than 50 individuals, or other factors." It is one of three turtle and tortoise species in the United States to be critically endangered. This designation is more grave than endangered.



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